STEEL

PRODUCTION
PROCESSING
DISTRIBUTION
USE

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Volnme 90 Number 1

STEEL

For forty-eight Years—IRON TRADE REVIEW

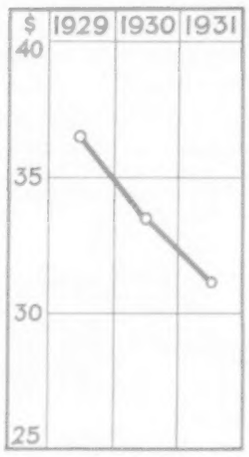
PRODUCTION ◆ PROCESSING ◆ DISTRIBUTION ◆ USE

The Year In Steel

DEPRESSION year that 1931 was, only in superlatives can the record of steel be written. Production, prices, profits, wages, new construction, all were the lowest in one to three decades. Considering capacity, steel last year made the poorest showing since it took rank as a major industry. Yet—the largest and tallest structure ever erected by man was completed in New York; the longest and highest suspension bridge was flung across the Hudson river; a record for structural steel awards was established by the 125,000 tons for the Rockefeller Radio City project; the largest merchant vessel ever laid down in an American yard was launched at Camden; foundations were put in for the unprecedented Hoover dam across the Colorado river.

More Pauper Than Prince in 1931

THUS, steel in 1931 was at once prince and pauper, modernizing the legend, but when future steelmasters and economists review the year they will be impressed by the pauperism. . . . Cold statistics will offer nothing in extenuation of a production of 25,597,000 gross tons of steel ingots and castings, only 38 per cent of the country's capacity and a scant 46 per cent of the record output of 1929. . . . Save for inconsequential accumulations of semifinished material, ingot statistics afford a true perspective on 1931 consumption, whereas the 18,383,000 tons of coke iron that were tapped included over 1,500,000 tons piled on furnace yards. . . .As in 1930, the building industry led in the consumption of finished rolled steel, taking 16.8 per cent. But automobiles regained second place at 14.7 per cent, forcing railroads to third at 14.6; oil, gas and water classification was fourth at 9.8 per cent. . . . In world production of steel the United States in 1931 maintained its supremacy but by a narrower margin. Of the 55,312,000 gross tons of ingots and castings, America supplied 37 per cent, whereas in 1930 she accounted for 43 per cent of the world output of 78,485,000 tons.



STEEL'S Composite Reflects Price Fall

Empire State, Tallest Building, Completed

Prices Low, but Rate of Decline Slows

SO CURTAILED an output inevitably intensified competition among producers of iron and steel, with commensurate pressure upon prices. Because the liquidation of 1931 was largely an overflow from 1930, the decline for the year as registered by the sensitive weekly iron and steel composite of STEEL was only 4.7 per cent, from $31.66 to $30.16, less than half the recession in 1930, yet many products actually were quoted at the lowest levels since before the World war. Reductions were greatest in scrap, least in pig iron. Especially for large structural jobs were producers a law unto themselves. The unsettlement was most pronounced as the year ended, not entirely a foreboding development because in the past this has been a concomitant of the culmination of depression.

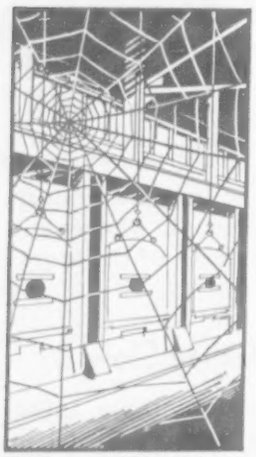
Improvements Centered on Finishing Mills

UPON new construction this depression in production and prices exerted a salutary and logical effect. It discouraged completely the addition of raw steel and iron-making capacity; for the first time since 1917 no open-hearth furnaces were undertaken. Of course,

projects initiated prior to 1931 were completed, including 21 furnaces by the Illinois Steel Co. at Chicago and six by the Bethlehem Steel Co. at Sparrows Point, Md. There was, however, a substantial amount of new construction and improvement of finishing mills, 35 rolling mills being completed and 21 building as of Dec. 31. The heaviest continuous plate mill in the world was completed at Chicago. Refinements at existing mills, installation of more sensitive controls were pronounced. . . . In 1931 the automobile industry again led in consumption of alloy steel, taking 72.6 per cent. Machine tool makers were second, at 6.1.

Surpluses Cushion Shock as Profits Vanish

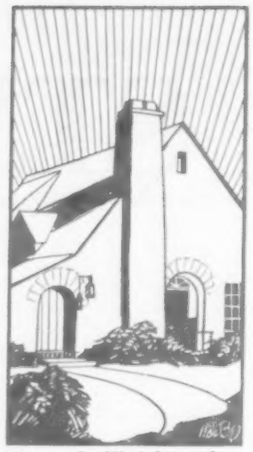
THIS conservatism in extending the industry was the sequel to market conditions rather than strained finances. Obviously, profits were attenuated in a 38 per cent steel year; in the first 9 months eight producers representing 77 per cent of the industry reported a net profit of 87/100 of 1 per cent upon their capitalization. Nevertheless, the position of the industry remained strong. Among integrated producers there were no failures, no financing of a distress nature. The ten producers rated at 1,000,000 tons or more of ingots annually and accounting for 84 per cent of all steelmaking capacity actually increased their surpluses, as of last Sept. 30, over those at the conclusion of 1929, the best steel year in history. The aggregate surplus of these producers as of Sept. 30 last was $1,221,167,332; on Dec. 31, 1930, it was $1,293,542,479; and on Dec. 31, 1929, it stood at $1,149,728,434.



Declare Moratorium on New Open Hearths

Need for Economy Stimulates Ingenuity

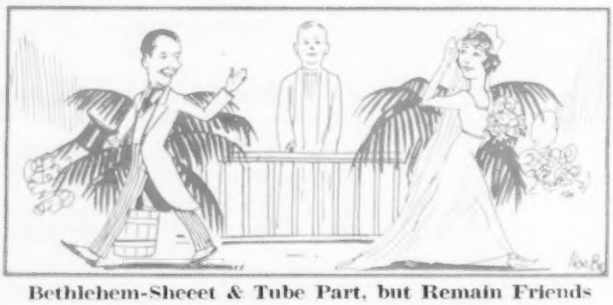
TECHNICAL progress flourished in 1931 upon the insistence for reduced costs. . . . Blast furnace engineers learned they could suspend stacks over the week-end, or keep blowing engines just turning over, without a blank of coke in front of the tuyeres. . . . More open-hearth furnaces were brought under automatic control; more waste heat boilers were installed. . . . Motors and control apparatus of rolling mill drives were improved, one sheet mill being equipped with an electric regenerative drag. . . . Forging manufacturers sought machine tool precision, reducing weight and working to closer limits. Rotary hearth heating furnaces gained in favor. . . . Preliminary work was done on a steel residence with a porcelain enameled exterior. . . . Fusion welding of pressure vessels received tremendous impetus from adoption of the A. S. M. E. code governing the practice. . . . In heat-treating practice the widespread approval accorded carburizing in gaseous atmosphere was the year's outstanding development. . . . New refinements in materials handling equipment, especially to meet the demands of special service, were prompted by considerations of economy. . . . An improvement in process made stronger rivets available. . . . Machine tool practice was more revolutionized than depressed. Significant trends included increased use of welded steel frames, adoption of systematic replacement programs.



Enamel Finishes for Residences Next?

Operating Personnel Survives 1931

CONSIDERING the turbulence of general business conditions, steel led a comparatively placid life in 1931. . . Among integrated iron and steel producers, the only merger was that of the Bethlehem Steel Co. with the McClintic-Marshall, Kalman, Hedden, Hay and Levering & Garrigues companies, greatly broadening its coverage of the structural and reinforcing bar markets. . . . After numerous legal vicissitudes, the attempt to consolidate Youngstown Sheet & Tube Co. with Bethlehem was abandoned. . . . None of the active operating executives of the larger iron and steel producers was removed by death in 1931, a necrology including William G. Clyde, Alva C. Dinkey and E. O. Marting. The iron ore industry suffered a loss with the passing of Samuel Mather. . . . Not rebuffed when the treasury refused to issue a dumping order, domestic producers of manganese kept agitation against imports from Russia alive all year. . . . A revised sheet classification recognized continuous mill practice. . . . An advance in class freight rates took effect Dec. 3, with an emergency rise in almost all rates scheduled to take effect Jan. 4, 1932.



Bethlehem-Sheeet & Tube Part, but Remain Friends

Steel Weathers Economic Gale but Strain May Compel Overhauling

BY E. C. BARRINGER
Associate Editor, STEEL

IN THE comparative calm that followed the revolution a French savant was asked what he had done during that troublous period. "I lived," was his terse but meaningful reply.

And so steel, after two years of unprecedented depression and liquidation, also can say that it lived.

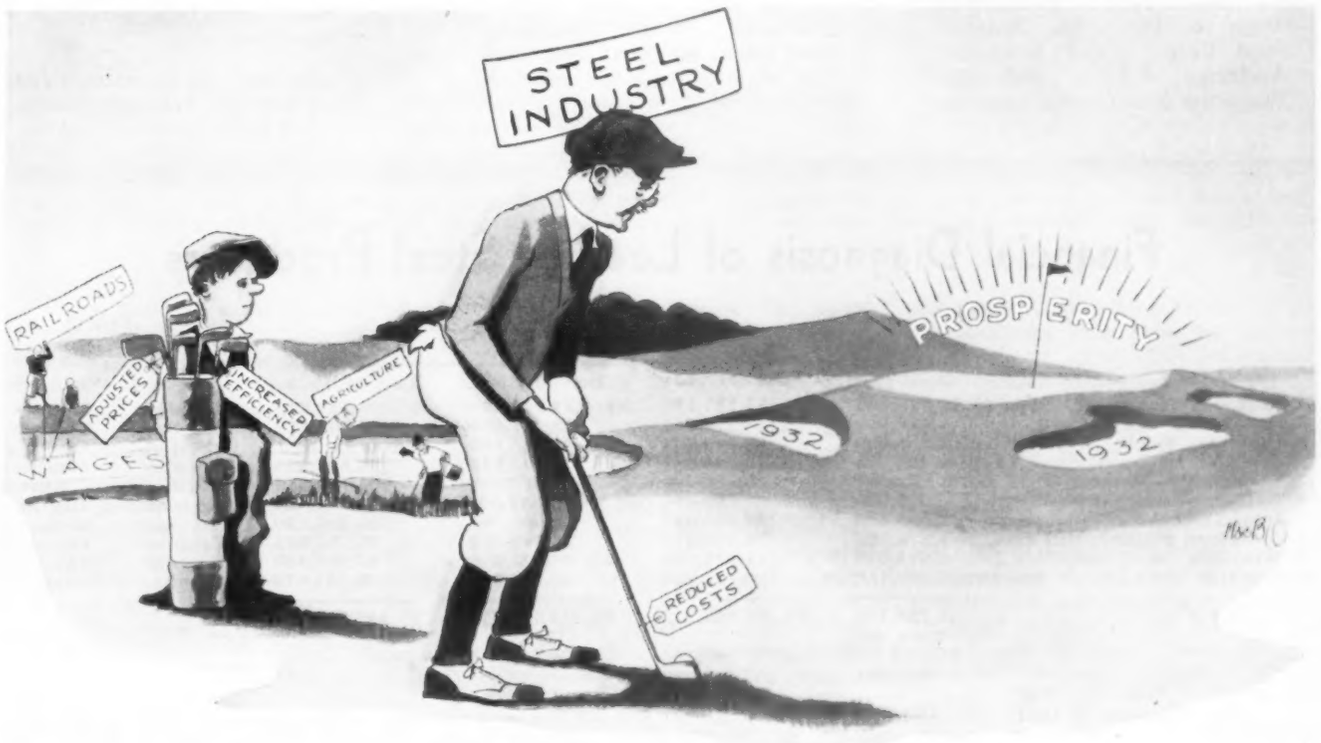
Not generously, of course; no industry could be expected to emerge unscathed from the economic ordeal through which the world has been passing since the fall of 1929. Nevertheless, steel has proved that its resources can be strained beyond what would be the elastic limit for most industries, and still recover.

Wheat and cotton may require the ministrations of a federal board; producers of copper may seek salvation in rationalization; the railroads may impose increased freight rates upon industries practically as prostrate as they; finance, local and international, may baffle economic experts. But steel asks no favors—simply closes its ranks and marches on.

This is not to minimize steel's wounds. They have been deep. The production of 24,928,000 gross tons of steel ingots and 18,328,000 gross tons of coke pig iron in 1931 was a scant two-fifths of the record output of 1929. Per capita consumption of steel in the United States last year retreated virtually to the level of 1908.

Under severe pressure, iron and steel prices have given way until the earnings of this $4,500,000,000 industry have vanished to ¾ of 1 per cent. Considering all factors, steel, rated at an annual capacity of 66,000,000 tons, was reduced by the close of December to the snail-like pace of an industry of only 18,000,000 tons.

For production and profits to be pruned back to the lowest level in modern times, considering capacity, must cause damage beyond the



If He Can Only Miss the Traps—

Steelmaking Capacity Expands Twice as Fast as Production

In Gross Tons

	Annual Capacity Open-hearth-Ingots and Castings	Actual Production	Per Cent Capacity Utilized	Annual Capacity Bessemer Converters	Actual Production	Per Cent Capacity Utilized	Blast Furnace Capacity, Coke and Charcoal	Actual Production	Per Cent Capacity Utilized
1930	59,502,170	35,049,172	59	8,107,875	5,035,459	62	51,850,775	31,020,907	59
1929	55,254,370	48,352,888	87	8,578,935	7,122,509	84	50,921,450	41,757,215	80
1925	47,830,920	38,034,488	79	8,769,334	6,723,962	77	50,424,190	36,116,311	71
1920	43,590,340	32,671,895	75	12,329,990	8,883,087	72	51,741,150	36,243,890	70
1915	30,788,350	23,679,102	77	14,464,725	8,287,213	57	45,033,825	29,524,789	66

power of a single season to repair. Yet, in the face of all this adversity, scrutinize the financial position of the industry:

> Not one integrated producer has defaulted on one dollar of interest or principal due on bonds or notes.
>
> Not one integrated producer is in receivership or in process of liquidation, nor have there been any mergers with a life-saving motive. Except for the Empire Steel Corp., manufacturer of sheet steel, this could also be said of the principal steel finishing companies.

There are ten integrated producers of steel rated at 1,000,000 tons or more of ingots annually, having a combined capacity of 55,200,000 gross tons or 84 per cent of the country's total: United States Steel Corp., Bethlehem Steel Corp., Republic Steel Corp., Jones & Laughlin Steel Corp., Youngstown Sheet & Tube Co., National Steel Corp., Inland Steel Co., American Rolling Mill Co., Wheeling Steel Corp. and the Crucible Steel Co. of America.

All but two of these corporations—National and Inland—have preferred stock issues outstanding, and only one—Republic—was passing its dividend at the close of the third quarter of 1931. Four of the ten—United States Steel, Bethlehem, National and Inland—at that time still were paying a common stock dividend.

Surpluses of these ten producers, as of last Sept. 30, the latest date for which they are available, were actually larger than on Dec. 31, 1929, which terminated the greatest year in the history of the steel industry, although showing a slight decline from Dec. 31, 1930. In actual figures, the aggregate of surplus of these producers was $1,221,167,332 on Sept. 30, 1931; $1,293,542,479 on Dec. 31, 1930; and $1,149,728,434 on Dec. 31, 1929.

Only three of these leading producers floated long-term bond issues last year, and none was of a distress nature. A $40,000,000 5 per cent 25 year bond issue by National Steel chiefly reimbursed it for new construction, especially at Detroit, and consolidated the funded indebtedness of its subsidiaries. An issue of $25,000,000 39-year bonds by Youngstown Sheet & Tube and a $15,000,000 4½ per cent bond issue by Inland also were for purposes of reimbursement.

In the short term field, American Rolling Mill marketed $15,000,000 in 4½ per cent 3-year notes. Including even the finishing interests, the only addition to this list is the Newton Steel Co., manufacturer of sheet steel, which offered $3,000,000 6 per cent 2-year notes.

Superficially foreign to the financial position of the industry, yet probably having a very direct bearing on it, is the fact that death in 1931 passed over the active executives of the principal producing companies, leaving their operating personnel virtually intact.

Assuming that the American standard of living has not been perma-

Financial Diagnosis of Leading Steel Producers

	Annual Steel Ingot Capacity Gross Tons	Surplus Sept. 30, 1931	Surplus Dec. 31, 1930	Surplus Dec. 31, 1929	Status of Dividends End of Third Quarter, 1931 Preferred	Common
1 United States Steel Corp.	26,778,000	$ 787,757,124	$ 821,960,591	$ 745,748,242	Regular	Reduced
2 Bethlehem Steel Corp.	8,610,000	115,514,117	128,471,434	134,565,632	Regular	Reduced
3 Republic Steel Corp.	4,806,000	56,668,709	63,425,872	(Not organized)	Omitted	Omitted
4 Jones & Laughlin Steel Corp.	3,420,000	70,068,881	74,749,352	72,897,638	Regular	Omitted
5 Youngstown Sheet & Tube Co.	3,120,000	45,532,650	51,912,591	51,729,886	Regular	Omitted
6 National Steel Corp.	2,000,000	51,000,000 (est.)	50,657,061	43,579,921	No issue	Regular
7 Inland Steel Co.	2,000,000	30,105,097	32,605,097	30,906,130	No issue	Reduced
8 American Rolling Mill Co.	1,876,705	23,480,212	24,780,431	23,755,643	Regular	Omitted
9 Wheeling Steel Corp.	1,614,640	11,327,706	14,875,208	16,980,466	Regular	Omitted
10 Crucible Steel Co. of America	1,000,150	*29,712,836	30,104,842	29,564,876	Regular	Omitted
Total	55,225,490 tons, or 84% of U. S. capacity	$1,221,167,332	$1,293,542,479	$1,149,728,434		

*As of June 30, 1931

New financing in 1931: Youngstown Sheet & Tube Co., $25,000,000 in 5 per cent bonds; National Steel Corp., $40,000,000 in 5 per cent bonds; Inland Steel Co., $15,000,000 in 4½ per cent bonds; American Rolling Mill Co., $15,000,000 in 4½ per cent notes.

nently impaired and that the nation has not attained its fullest economic development, steel—certainly an essential industry—is bound to come back.

Whether it will make notable progress in this direction in 1932 only time will disclose. Majority opinion is that the excesses which culminated in 1929 have been jettisoned, that domestically the country has set its house in order. Almost paradoxically, Europe is the crucial issue of America.

Is steel ready to come back? Will competition take new forms? What new conditions will confront industry in general?

It would appear demonstrated that steel is sound financially. In event demand drags for a half year or more, the advantages accruing from reduced wages effective Oct. 1, adjustments in salaries and generally lowered costs provide a cushion not wholly realized until the final quarter of 1931. Should demand expand production, the benefits of these economies will redound the more. Steel passed from the profit area when its operations dropped below 55 per cent, but it seems probable that on the adjusted cost basis it can re-enter the profit area when production passes 45 per cent on the way up.

So long as individualism is the national policy of the United States in business, the price situation—and very directly, of course, the matter of profits—will remain the creature of the ebb and flow of demand. The agitation for liberalization of the antitrust laws has attracted noteworthy support, beginning with the President and including some influential forces in congress and banking and industrial life. The theory of liberalization is meritorious and logical, yet no substantial hopes for prompt action can be entertained.

Individualism is a tenet of the Democratic party, which is now in control of the house of representatives at Washington and is sufficiently strong in the senate to deadlock that body. Only 11 months distant is a presidential election, and always in the past, economic distress has proved a heavy liability to the party in power. It is safe to assume that the Democratic party will follow a conservative policy and depart little from tradition. The odds greatly favor no change at all in the antitrust laws, and should any amendment slip through it doubtless would be innocuous.

Therefore, whatever industry does to eliminate present uneconomic, sometimes vicious, competition must be under the antitrust laws now on the statute books, which is not an alluring prospect. In fact, the only gesture in the entire steel industry toward working out a program has been made by structural steel fabricators through the American Institute of Steel Construction Inc., which is perfecting a rationalization plan.

With the survival of the fittest thus indicated as the basis for industrial action in the near future, it may logically be asked: Is steel overbuilt? Should a portion of its capacity—obviously the older, uneconomic portion —be scrapped?

For two years, Charles M. Schwab, chairman of Bethlehem Steel and president of the American Iron and Steel institute, has been advocating a moratorium on new construction.

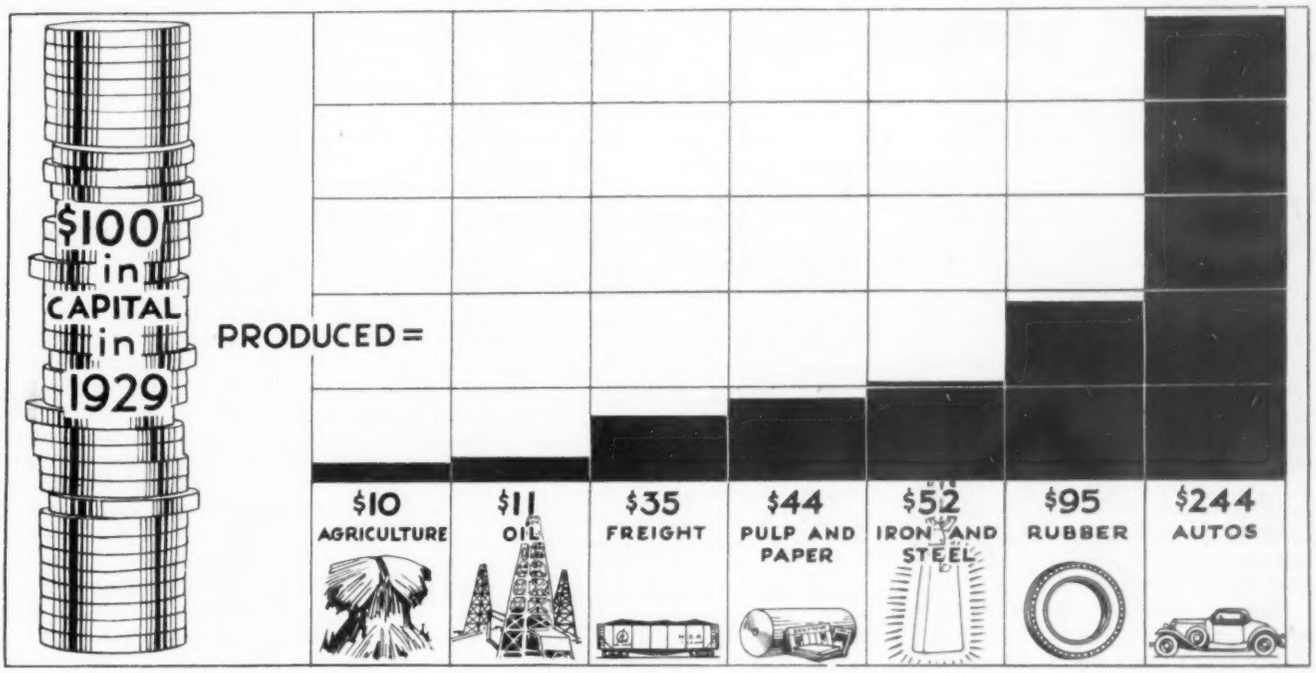
Under the lash of 1931, a minimum of mill construction was undertaken, as the compilation on pages 171-173 of this issue reveals. For the first time since 1917, no open-hearth furnaces or bessemer converters were put under construction last year.

But the individualistic character of expansion in steelmaking capacity in recent years is evidenced by the accompanying table, recording the increase in capacity since the war.

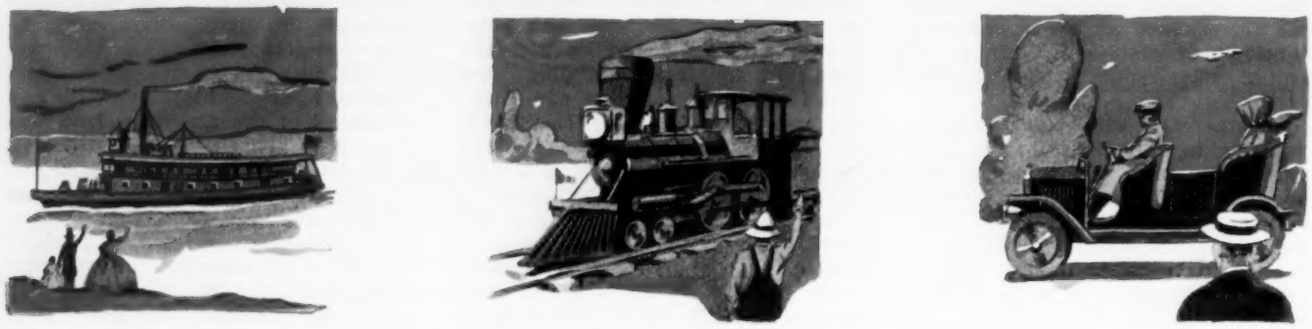
From 1915 to 1930 the anual capacity for producing open-hearth ingots and castings rose from 30,788,350 gross tons to 59,502,170, or 93 per cent. Actual production in the period ascended only from 23,679,102 tons to 35,049,172, or 48 per cent. In 1915, this capacity was engaged 77 per cent, while in 1930, now reckoned as a comparatively good steel year, only 59.

In the bessemer department of the industry has come an adjustment necessitated largely by the supersedence of its product by that of the open-hearth furnace. From 1915 to 1930 the bessemer capacity of the country declined from 14,464,728 gross tons to 8,107,875, production meanwhile tapering from 8,287,213 tons to 5,035,459. Bessemer con-

(Concluded on Page 183)



In this chart industries are described by their principal product. Agriculture, of course, includes all farm products; oil embraces gasoline, kerosene and like derivatives; freight is used as a blanket classification including all railroad revenue; pulp and paper is self explanatory as an industry; iron and steel includes all finished steel products and the value of merchant pig iron; by rubber is meant all manufactured rubber articles; and under autos are included trucks and all automotive products



Each advance in transportation brought demands for more grades and varieties of steel, necessitating more intricate price schedules, extras, etc.

What Can Be Done About Prices?

BY E. L. SHANER

Editor of STEEL

OF ALL the problems arising in business none is more difficult of solution than that pertaining to prices. The question of just payment for one's goods or services is older than industry itself, yet centuries of experience in barter and trade have failed to eradicate certain inexcusable practices. Even today the sale of many highly developed materials, products and manufactured articles is attended with as much uncertainty and with as much trouble in arriving at an equitable basis of exchange as was the striking of a bargain 3000 years ago.

Through the ages numerous refinements have been introduced. Monetary systems were set up to simplify exchange. Contracts were employed to define the terms of buying and selling. Specifications were written to insure minimum standards of quality. Price lists were published to standardize prices. Discounts were adopted to eliminate the necessity of changing intricate base price schedules. As the number of saleable items increased, the expedients for codifying, classifying, defining, regulating and otherwise controlling the factors influencing sales multiplied by leaps and bounds.

♦ ♦ ♦

Out of this long experience has been evolved the merchandising practice of today. Fortunately it can be said that in certain lines of business ethics of selling never were higher. In many branches of retail trade one can go into a store with the assurance that there is but one price to all for each item on the shelves and counters.

But in industry this ideal situation is the exception rather than the rule. In the steel industry under the circumstances now prevailing, the matter of price is of vital importance. Hundreds of companies in which the operating personnel has performed miracles in economy to the end that profits might be realized in spite of the low volume of business are throwing away this hard-earned advantage in pricing the product.

The problem of maintaining prices in a time of keen competition never has been solved in the steel industry. Many executives are resigned to the belief it never will be solved. The subject is under constant discussion. Every president and salesmanager has attacked the problem from every possible angle and largely without result. The apparent futility of trying to do anything about price cutting has made many steelmakers dogmatic on the subject. Repeated failure has led many to the belief that the solution must await a radical improvement in the qualities of human nature.

Cannot Ignore Human Element

There is no denying the fact that the human element is a big factor in price competition. Anyone who is at all familiar with what is going on in the steel industry knows the demoralizing influence of the destructive practices of the minority. Most of the sales managers who are trying to do right under most discouraging circumstances are not fooled by the few who give sanctimonious lip service to high business ethics but in actual practice waive honesty, sincerity, extras, freight and anything else that is required in the effort to steal away a steady customer from a competitor. These unprincipled raiders of honest business are responsible for much of the present trouble, but in contemplating the woes traceable to their door, one should not overlook the many other factors, some of which fortunately are susceptible to correction.

In fact, as one reviews the evolution of trade practices in the steel industry, he is inclined to wonder whether many of the steps taken in the past few decades—all of them calculated to improve conditions—have not in reality made it easier for the unscrupulous seller to indulge in unfair practices. Can it be possible that instead of curbing his destructive activities, the well-meaning leaders of steel unwittingly have played into his hands?

♦ ♦ ♦

In the early days extending through the wrought iron era and well into the age of bessemer steel, pricing of the product was comparatively simple because there were few grades and varieties. Some of the old invoices and bills of sale indicate that the fixing of prices lay largely within control of the seller, without much regard for outside influences.

But as transportation improved, as the industry spread westward and as the railroads and agricultural implement makers began to ask for steel in new sections and in a greater variety of sizes, shapes and gages, the matter of price became more complicated. After the turn of the century, when the automobile industry began to make demands, not only for new sizes and shapes but also new steels and numerous unheard of finishes, the industry was obliged to go to great lengths in establishing intricate price schedules to meet the conditions.

Today there is a superfluity of steels, shapes, forms, sizes, treatments, gages and finishes. If it were possible to secure the co-operation of all interests the number of overlapping varieties could be reduced to an astonishing degree. One of

the most important and certainly the most beneficial accomplishment in this direction in recent years was the simplication and partial elimination of duplication in wide flanged columns effected by the two largest steel companies. What they did so successfully in shapes could be accomplished with even less difficulty by many producers of bars and other lighter finished steel products.

Minimizing Extras

While reduction of varieties and sizes would not wield a powerful influence on prices, it would tend to halt the trend toward an increasing number of extras. Steel price extras are essential; they cannot be avoided. But in times of sharp competition they provide an easy way out for the sales manager who wants to shade prices without doing it openly. Under present conditions young purchasing agents whose experience dates back only a few years may be pardoned if they have gained the impression that extras are a device invented by steel companies to afford flexibility in price negotiations.

All purchasers of steel and indeed not a few steel salesmen can well afford to study the following statement on extras, which was presented many years ago to members of the American Iron and Steel institute by J. Leonard Replogle, then vice president of the Cambria Steel Co.:

"Extras are, or should be, a legitimate increase over the base price of steel products and should represent only the increased cost over what are regarded as standard sizes, quality or grades. . . . Without extras the unreasonable buyer (happily in the minority) would insist upon unnecessary discards, refinements and restrictions which would increase costs to such an extent as to heavily penalize every buyer of steel."

Salesmen who waive extras under stress probably think that the mill assumes all of the added burden. The customer thinks he has received a favor. What really happens is that if waiving of extras becomes general during a period like the present, the costs which should have been borne by a certain few are partly absorbed by the mill and partly redistributed broadly to many customers. In the end customers are bound to share part of the cost of this ill-advised practice.

A good answer to the question of extras, prompted by Mr. Replogle's statement at the institute meeting just referred to, was offered by John L. Haines, Jones & Laughlin Steel Corp.:

"Prices may rise and prices may fall. Extras should stand like the Chinese Wall."

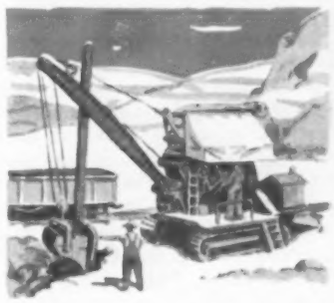
The advice is as good today as when it was voiced 19 years ago.

♦ ♦ ♦

Probably no single factor intrudes itself so obnoxiously into the price situation as that of railroad freight rates. The entire rate structure with its intricate provisions for fabrication-in-transit and other complications could not be improved upon if it had been created specifically for the purpose of aiding and abetting the confirmed price cutter. This is not a criticism of the rates or of rate-making policies. Everyone recognizes the difficulties involved in establishing tariffs which do justice alike to all factions, to interests in competitive geographical areas, and to shippers, railroads and the public at large.

Nevertheless, it is a fact that many features of the existing rate schedules furnish convenient loopholes for juggling steel prices and freight rates, the invariable effect of which is to undermine prices. That mysterious rate freak, known as "fabrication-in-transit," is blamed for seriously disrupting the structural steel industry. In view of the complexities of its provisions it is difficult to determine whether the real trouble lies with the rate policy itself or with the abuses on the part of shippers which are permitted by it.

At the spring meeting of the American Iron and Steel institute in 1928 President Schwab spoke feelingly on the evils of what he called "cross-hauling." He declared that it is "manifestly uneconomic for a steel manufacturer in Chicago to ship 100,000 tons of steel to Pittsburgh at a time when a Pittsburgh steelmaker is shipping a quantity of like material from Pittsburgh to Chicago."



Is it right to take iron ore from Mother Nature for steel on which no profit is made?

Yet the fabrication-in-transit device actually encourages cross hauling. It tends to close the door on local concerns permitting a competitor from a distance to come into what would seem to be their logical territory. Even this would not be so bad if the distant competitor pocketed the profit which accrues to him by virtue of the freight advantage. But in most cases he deducts the money value of this advantage from his quotation, thus smashing the market to a point where it is impossible for anyone—favored by rates or handicapped by them—to do business in that territory except at a loss.

♦ ♦ ♦

Too Many Basing Points?

Closely allied with the freight rate factor is the problem of basing points. It is now seven years since the federal trade commission ruled against "Pittsburgh plus." The complaints on which the commission based its far-reaching decision centered around the contention that under the existing Pittsburgh base local mills quoted prices identical with those of distant mills and that the price of steel to consumers (particularly those in the Middle-West) was maintained at an unduly high level by this practice.

While no one has voiced publicly a desire that the old Pittsburgh-plus policy be restored, there are thousands of well informed sellers and buyers of steel who believe that the old plan was better than the system of multiple basing points now in vogue. Opinions

Much of the steel that goes into modern structures—monuments to American skill and ingenuity—is sold at less than cost

solicited by STEEL from competent observers in all of the important centers where steel is sold are overwhelmingly in favor of a single basing point.

However there are many shades of opinion as to how abolition of Pittsburgh plus has affected buyers and sellers. An eastern authority comments: "At first the change favored consumers at the expense of the mills, but this condition has been altered. The result is that advantages enjoyed on certain products by consumers in some sections are compensated for by disadvantages to consumers located in other sections."

Another offers this observation: "Abandonment of Pittsburgh plus has resulted in so many different basing points that the advantages are decidedly to those companies having mills in various districts. Also there is a great opportunity for what you might term tricky prices, due to the various basing points. The single basing point would have been an advantage in stabilizing the market."

Multiple Basing Points Confuse

Many express the opinion the multiple basing system has been disastrous to the steel construction industry. It is stated that a St. Louis fabricator now does not know whether he is in Chicago mill territory, Kansas City territory or eastern sales territory, as prices from various producing centers—absorbing freight rates and meeting other conditions—may come from nearly all parts of the country.

A few observers cite certain minor advantages of the multiple base, but the opinion is strongly against it. One critic sums up the situation as follows:

"The courts abolished the Pittsburgh base point and later numerous other base points were established. The result has been similar to the condition of the man in the parable who had one devil which was cast out, but later took to himself several other devils, and the last state of the man was worse than the first."

Effect Is Demoralizing

Regardless of what may be said of the merits of one basing point against several, it is certain that in a period of price weakness the presence of numerous bases and the opportunity to establish additional ones if expediency seems to demand it tend to confuse rather than to clarify the price situation.

No one believes that a single basing point will be restored. If relief is forthcoming, it must come from modifications of freight rates and the exercise of better judgment on the part of steel sellers in establishing basing points.

♦ ♦ ♦

Nothing that the American steel industry could do would be of greater benefit than a thorough study of the factors discussed in this article which influence prices. The problems of extras, freight rates and their interpretation, basing points, etc., could be studied openly without conflicting with the intent and letter of the law.

If these factors could be given the same expert attention that is devoted to operating problems in the steel industry, much of the confusion now prevailing would be eliminated. Moreover many of the temptations to cut prices without justification would be removed.

Strong pressure will be brought to bear if the industry does not act soon. Already several groups have publicly demanded that single prices be established. The undercurrent of complaint against alleged price discrimination is growing stronger every day. The sooner all prices can bear the light of public scrutiny the better for all concerned.

Industry's Ethics Improve

The American steel industry has advanced to a higher plane of business ethics during the past three decades. Today no responsible leader would dare utter the following words, which represented part of the creed of a prominent steelmaker in the late nineties: "Next to making money yourself the best thing to do is to make your competitor lose money."

"Live and let live" is the accepted policy of today, but full observance of that much to be desired ideal will not be effected until the influential members of the industry are more actively concerned with the defects of the present price policy.

When steelmakers arrive at the stage where there is no reason for secrecy in prices then the policy "live and let live" will mean more than it does today.

The Thinker—"Why do I operate these furnaces and mills?" . . . There is but one correct answer—"Profit"

Building Retains Lead in Steel Consumption

Automotive Industry Passes Railroads As Second Largest Consumer

THE building industry in 1931 widened its margin of leadership as the principal consumer of finished rolled steel. The automotive industry barely nosed out the railroads to regain second place, railroads going to third. Oil, gas and water remained fourth. This annual survey of finished rolled steel distribution, the eleventh since inaugurated by *Iron Trade Review*, and carried forward by STEEL, its successor, shows greatly reduced consumption.

Data for 1931 are based on reports from 77 companies producing 96.88 per cent of all finished rolled steel and having 90.21 per cent of the country's steel ingot capacity. Of the 1931 total, 16,965,885 gross tons was reported by companies that in 1930 indicated distribution of 25,067,168 tons. A number of companies reporting in 1930 showed no output for the past year. Twenty-three companies reported operating rates for 1931. The highest ingot rate reached by one was 75 per cent, while the lowest, 15 per cent, was shown by two. The highest rate of operation for finishing mills was 56 per cent and the lowest 18 per cent.

Eliminating forms of semifinished steel requiring further processing, such as billets and blooms, skelp, sheet bars and wire rods, total finished rolled steel consumption from domestic mills in 1931 was estimated at 17,956,582 gross tons. This compares with 28,686,600 tons reported by STEEL in 1930.

The building industry in 1931 required 16.80 per cent of all finished steel or a total of 3,016,706 tons. Both percentage and tonnage dropped from 1930 when 17.80 per cent accounted for 5,106,215 tons. More than a million tons of this loss was in plate, shape, bar and concrete bar consumption. Total demand for framework and other erection materials, actually reported to STEEL, fell from 3,607,113 tons in 1930 to 2,147,011 tons in 1931.

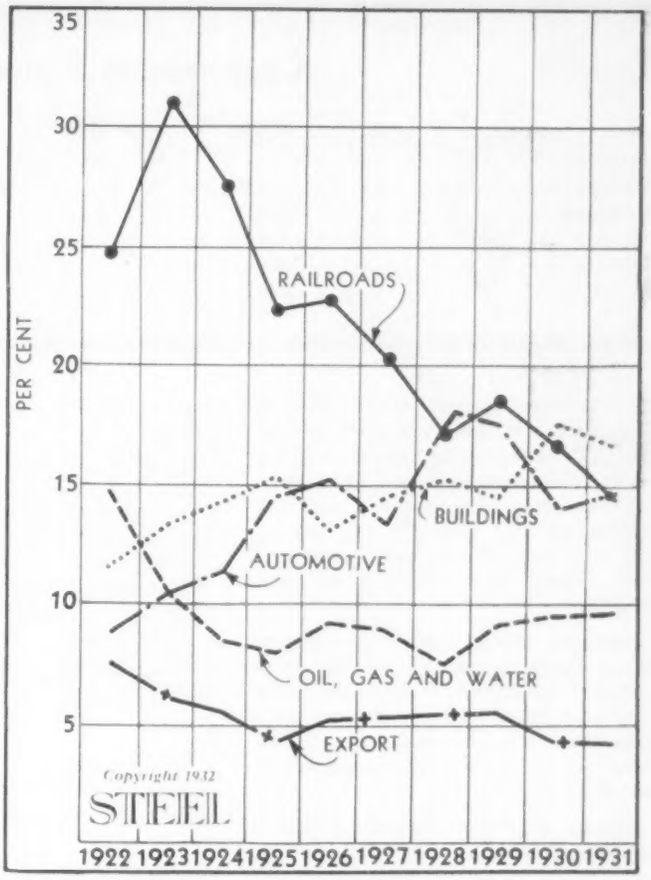
Greatly reduced earnings of the railroads in 1931 were reflected in decreased purchases of steel for rolling stock and trackage. Consumption in 1931 by the carriers accounted for only 14.65 per cent of all finished steel, continuing the general decline from the high point in 1923 when they took 31.02 per cent. Computed purchases for 1931 amounted to 2,630,639 tons compared with 4,862,379 tons in 1930.

Despite severely curtailed production schedules in the automotive field during the past year, this industry regained second place as a steel consumer, taking 14.78 per cent of all finished steel, or 2,653,983 tons. This compares with 14.10 per cent and 4,044,811 tons in 1930 and 17.57 per cent and 6,870,432 tons in 1929, the peak production year.

The only other major consuming group to increase its ratio, besides automotive, was the oil, gas and water field. This group took 9.75 per cent of all finished steel in 1931, or 1,750,767 tons. In 1930 the oil, gas and water industry took only 9.48 per cent of the total, ut consumed 2,719,489 tons.

Decline in finished steel exports reflected unsettled world economic conditions. Computed shipments dropped from 1,244,998 tons in 1930 to 736,220 tons in 1931. These figures represent only finished steel and do not include exports of pig iron, steel scrap, forging billets, etc. Ratio of exports to total declined from 4.34 per cent in 1930 to 4.10 per cent in 1931.

All other consuming groups increased to 39.92 per cent



Consumption of Finished Rolled Steel by Major Industries from 1922 to 1931

How Steel Ingots Shrink

			Gross Tonnage
Steel ingot production, 1931, (11 months actual, December estimated)			25,115,000
Ingots to forgings direct		175,303	
Loss in conversion of ingots to semi-finished steel, 20 per cent		4,987,939	5,163,242
Semifinished steel production			19,951,758
Loss in conversion of semifinished to finished steel, 10 per cent			1,995,176
Total finished rolled iron and steel			17,956,582
Distribution—Industry	% of total	Tonnage	
Buildings	16.80	3,016,706	
Automotive	14.78	2,653,983	
Railroads	14.65	2,630,639	
Oil, gas, water	9.75	1,750,767	
Exports	4.10	736,220	
All other	39.92	7,168,267	
Totals	100.00	17,956,582	17,956,582

Consumption Ratios of Main Groups

	1931	1930	1929	1928	1927	1926	1925	1924	1923	1922
Buildings	16.80	17.80	14.70	15.22	14.89	13.10	15.26	14.44	13.53	11.83
Automotive	14.78	14.10	17.57	17.76	13.34	15.09	14.60	11.37	10.59	8.93
Railroads	14.65	16.95	18.44	17.02	20.37	22.81	22.26	27.54	31.02	24.96
Oil, gas and water	9.75	9.48	9.01	7.72	8.90	9.29	8.03	8.43	10.60	14.84
Exports	4.10	4.34	5.83	5.52	5.39	5.29	4.47	5.89	6.22	7.83
All other	39.92	37.33	35.45	36.76	37.11	34.42	35.36	32.33	28.04	31.56

in 1931, the highest figure reached since these surveys were started. The principal gains were made by the highway construction and food packing industries. Highways and highway bridges in 1931 took 408,926 tons or 2.35 per cent of the total, compared with 395,370 tons and 1.54 per cent in 1930.

Although the food packing and container industry tonnage dropped from 1,486,351 to 1,374,771 tons, the ratio increased from 5.77 to 7.90 per cent. Approximately 100,000 tons of this drop was in black plate for tinning in the food packing industry.

Mining and lumbering continued a secondary consumer, taking 0.83 per cent of the total in 1931, compared with 0.69 per cent in 1930. More than one-third this consumption, as usual, was in rails for mine and industrial trackage. Shipbuilding was unable to maintain its proportionate ratio, dropping from 1.20 per cent of consumption in 1930 to 1.03 per cent in 1931. The tonnage drop was from 308,491 to 179,181. Of this loss, plates accounted for 89,163 tons and shapes for 22,228 tons.

The manufacture of machinery, tools and equipment, including electrical appliances required only 3.37 per cent of all steel in 1931, compared with 3.80 per cent in 1930. The largest tonnage loss was in bars, which dropped from 303,748 to 167,182 tons.

An added refinement in this year's analysis segregated agricultural implements from all other farm uses.

An interesting trend of consumption is indicated by the following comparison of 1931 with 1930 and 1929, showing the percentage of all steel represented by the leading products. Most striking is the decreasing proportion of steel going to bars. This ratio dropped from 18.31 per cent in 1929 to 12.63 per cent in 1931. The most marked increase was in tin plate or black plate for tinning. This product gained from 4.75 per cent of the total in 1929 to 6.21 per cent in 1930 and then jumped again in 1931 to 8.14 per cent. As the total tonnage consumed dropped through those years, this trend shows a marked stability in the annual requirements of tin plate.

Product	Per Cent of Total 1931	1930	1929
Sheets, ex. galv.	12.81	12.14	12.18
Bars, except concrete	12.63	14.45	18.31
Pipe and tubes	11.21	11.23	10.77
Structural shapes	10.87	11.53	10.78
Plates	9.00	11.73	11.50
Tin plate	8.14	6.21	4.75
Wire products	8.60	6.93	5.97
Rails	6.63	6.94	7.35
Strip	5.73	5.17	5.40
Galvanized sheets	4.09	3.79	3.80
Hoops and bands	3.23	2.23	2.64
Concrete bars	2.92	2.53	1.92
Angle bars, ties, etc.	2.63	2.94	2.89
All other products	1.51	2.18	1.74
	100.00	100.00	100.00

Few changes occurred in the position of the jobbing trade. In 1931 12.68 per cent of all steel flowed through that channel of distribution, compared with 12.21 per cent in 1930.

Semifinished steel shipments decreased in harmony with those of finished steel. Sheet and tin bar shipments in 1931 declined less than those of billets and slabs. Wire rod shipments dropped the least. The following figures show comparison of semifinished steel sent by producers to other mills for further conversion in 1931 and 1930:

	Gross Tons 1931	1930
Billets and slabs	616,556	1,012,720
Sheet and tin bars	885,091	1,226,974
Wire rods	329,079	419,352
Skelp	360,790	568,221

Distribution of Steel

Reported by 77 Companies and Producing 96.88

	Rails	Angle bars, steel ties, track accessories	Plates	Structural shapes Over 3-inch	Bars, except concrete, and shapes under 3-inch
1—Railroads					
a Cars and locomotives	4	1,527	225,161	80,736	113,303
b Track construction and repair	1,036,957	423,317	4,448	2,994	28,667
c Buildings and bridges	635	63	61,609	226,485	38,027
2—Buildings					
a Erection materials, frame, trim, etc.	262	257	292,223	1,055,950	172,626
b Furnishings, furniture, stoves, etc.	....	....	3,511	2,491	46,590
c Other products for buildings	....	....	9,601	778	16,601
3—Highways and highway bridges	5	400	22,130	83,879	19,617
4—Automotive	214	42	103,394	9,492	724,124
5—Oil, gas and water	2,806	313	359,575	40,243	30,178
6—Mining, quarrying & lumbering	50,395	13,556	27,236	6,450	14,226
7—Agricultural					
a Implements	131	246	10,540	3,117	103,401
b All other agricultural	....	....	10,000	5,127	31,792
8—Shipbuilding and repair	1	....	102,949	41,459	22,334
9—Machinery, tools and equipment (including electrical)	902	129	83,729	4[illegible],626	167,182
10—Food and packing industry (All containers)	....	....	22,045	403	1,678
11—Exports	51,761	5,121	67,840	90,637	50,079
12—Miscellaneous	5,749	2,889	68,095	49,031	370,591
Totals	1,149,822	447,860	1,474,086	1,745,898	1,951,016
Jobbers	3,343	9,935	92,282	146,224	247,335
Grand totals	1,153,165	457,795	1,566,368	1,892,122	2,198,351

Distribution of Steel in Per Cent to Consuming Groups

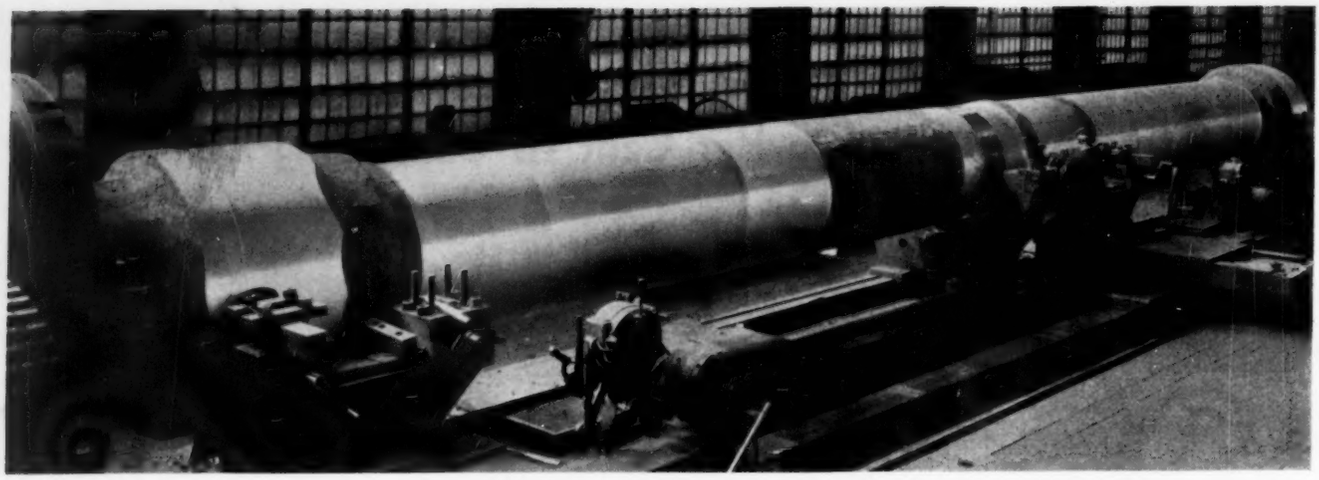
	Rails	Angle bars, steel ties, track accessories	Plates	Structural shapes	Bars, except concrete; shapes under 3-inch	Concrete bars	Hoops and bands, Narrow Flats	Black plate for tinning	All other black plate and sheets, except galv.	Galvanized sheets	Strip steel	Tubing and pipe	Wire products
1—Railroads													
a Cars and locomotives	....	0.33	14.38	4.27	5.15	....	1.84	....	3.15	3.04	0.45	0.97	0.59
b Track construction and repair	89.92	92.47	0.28	0.16	1.30	0.07	0.01	....	....	....	0.13	0.02	1.95
c Buildings and bridges	0.06	0.01	3.93	11.97	1.73	3.79	0.23	0.02	0.09	0.81	0.02	0.04	0.45
2—Buildings													
a Erection materials, frame, trim, etc.	0.02	0.06	18.67	55.80	7.85	48.70	5.95	0.05	3.56	9.78	2.82	2.01	7.42
b Furnishings, furniture, stoves, etc.	....	....	0.22	0.13	2.12	0.01	2.76	0.16	13.11	4.07	2.98	0.33	5.06
c Other products for buildings	....	....	0.61	0.04	0.76	0.22	3.27	0.68	2.05	5.68	4.99	3.31	0.76
3—Highways and highway bridges	....	0.09	1.41	4.43	0.89	27.75	0.02	....	2.70	5.69	0.21	....	2.49
4—Automotive	0.02	0.01	6.61	0.50	32.94	....	45.66	0.40	33.56	0.63	58.62	1.38	5.82
5—Oil, gas and water	0.25	0.07	22.96	2.13	1.37	1.52	0.97	1.14	3.85	2.18	0.02	56.79	0.46
6—Mining & lumbering	4.37	2.96	1.74	0.34	0.65	0.22	0.36	....	0.26	0.57	0.02	0.12	0.69
7—Agricultural													
a Implements	0.01	0.05	0.67	0.16	4.70	....	6.30	....	1.06	1.73	0.91	0.12	2.63
b All other agricultural uses	....	....	0.64	0.27	1.45	....	5.00	....	0.54	2.45	....	....	18.23
8—Shipbuilding and repair	....	....	6.57	2.19	1.02	....	0.09	....	0.21	0.24	....	0.12	0.13
9—Machinery (including electrical)	0.08	0.03	5.35	2.47	7.60	0.73	3.02	0.02	6.52	0.74	4.49	2.33	0.84
10—Food and packing industry (All containers)	....	....	1.41	0.03	0.08	....	6.45	79.66	5.82	1.04	0.88	0.03	2.70
11—Exports	4.49	1.12	4.32	4.79	2.28	0.70	1.42	10.08	2.84	7.42	1.07	3.59	5.30
12—Miscellaneous	0.49	0.63	4.35	2.59	16.86	0.46	12.19	5.36	10.63	6.73	18.81	2.32	15.27
Jobbers	0.29	2.17	5.88	7.73	11.25	15.83	4.46	2.43	10.05	47.20	3.58	26.52	29.21
Grand totals	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

in Gross Tons to Consuming Groups

Having 90.21 Per Cent of Country's Ingot Capacity

Per Cent of All Finished Rolled Steel

Concrete bars	Hoops and bands or Narrow Hot Rolled Flats	Black plate for tinning	All other black plate and sheets, except galv.	Galvanized sheets	Strip steel	Tubing and pipe	Wire products	All other finished steel products	Grand Totals, all finished products	Per Cent of Total
12	10,295	20	70,122	21,614	4,519	18,983	8,891	82,961	638,148	3.67
333	74	....	....	....	1,261	425	29,263	17,363	1,545,122	8.88
19,282	1,298	311	2,023	5,731	150	727	6,771	1,816	364,928	2.10
247,760	33,397	690	79,244	69,649	28,065	39,190	110,967	16,731	2,147,011	12.34
36	15,484	2,200	292,114	28,931	29,720	6,404	75,743	816	503,750	2.90
1,090	18,364	9,558	45,694	40,411	49,732	64,617	11,340	4,376	272,162	1.56
141,135	128	....	60,245	40,504	2,065	....	37,208	1,610	408,926	2.35
....	256,261	5,604	749,987	4,518	583,948	26,910	87,043	19,633	2,571,170	14.78
7,718	5,466	16,153	85,911	15,546	183	1,107,150	6,908	17,910	1,696,060	9.75
1,100	2,033	19	5,778	4,067	237	2,351	10,382	6,106	143,936	0.83
....	35,359	43	23,680	12,340	9,012	2,425	39,304	1,212	240,810	1.38
10	28,079	....	12,095	17,425	....	....	272,632	2,000	379,160	2.18
....	522	....	4,613	1,690	1	2,332	1,973	1,307	179,181	1.03
3,689	16,934 *	297	145,383	5,235	44,739	45,342	12,496	14,225	586,908	3.37
....	36,213	1,127,449	129,775	7,375	8,802	569	40,433	27	1,374,771	7.90
3,544	7,945	142,630	63,340	52,860	10,604	69,970	79,249	17,091	712,671	4.10
2,354	68,394	75,907	234,983	47,864	187,366	45,217	228,371	39,902	1,426,713	8.20
428,063	536,248	1,380,881	2,004,990	375,760	960,404	1,432,612	1,058,704	245,086	15,191,427	87.32
80,586	25,047	34,435	223,937	335,869	35,671	516,968	436,981	16,957	2,205,570	12.68
508,649	561,295	1,415,316	2,228,924	711,629	996,075	1,949,580	1,495,685	262,043	17,396,997	100.00



Large boiler drum forged from alloy steel and being subjected to a triple machining operation

Automobiles Lead in Alloy Steel Use

BY J. D. KNOX
Associate Editor, STEEL

EVERY industry which is normally an important user of alloy steel was seriously affected by reductions in the volume of business in 1931. Under the circumstances, it would be expected that certain shifts in the trend of consumption would be revealed.

However reports from the principal producers of alloy steel show no radical departures from the figures of recent years. As indicated in the table on this page the automotive industry still leads all other consumers by a margin somewhat greater than in 1929 and 1930. Second and third places continue to be held by the machine tool and agricultural groups, respectively. The only important change in ranking—and this may prove in later years to be significant—is the advance in 1931 of the railroads from fifth to fourth place. By virtue of this change, the oil industry, as shown in the table below goes from fourth to fifth in rank. For some time there has been evidence of a renewal of interest by railroads in alloy steel. The roads represent a truly important potential consuming field for alloys, but only in the past two years has steel of alloy grade gone into locomotives and cars for parts heretofore made of carbon steels. It will be interesting to see whether the 1931 consumption figures reflect a flash in the pan or the beginning of a continued greater reliance on alloy steels.

The increase of the percentage credited to the automotive industry is somewhat surprising. The trend had been toward a diversification in consumption, and it seems logical to expect that over a period of years the lead held by the automobile builders would diminish as the use of alloy steel spread and increased in other fields of consumption.

Cold Drawn Shows Increase

Certain changes in the detailed consumption figures are somewhat striking. The sudden leap in the percentage of cold drawn bars looks erratic, yet a similar spurt occurred in 1929 and furthermore it is well known that interest in cold-finished material for machinery parts has been increasing.

Corrosion-resisting steel alloys, of which the 18 per cent chromium and 8 per cent nickel metal is the most prominent, have furnished the bright spot in an otherwise dull steel market during the last two years. Sales according to some of the largest distributors, exceed those of 1930.

One large distributor predicts a bright future for 18 per cent chromium steel with the likelihood of considerable tonnage developing for this alloy for bridges and other heavy structures despite high first cost. A 26-30 per cent chromium steel is especially favored for high temperature work and for its resistance to oxidation and scale. Satisfactory trial of 18 per cent chromium steel also was made last year in locomotive firebox side sheets.

At the annual convention of the American Society for Steel Treating held in Boston last year it was stated that a large quantity of corrosion-resisting steels of the 18-8 grade is being manufactured into wire for use where a high degree of resistance against corrosion is required. One such application was a steel cable which was placed in successful service for marine work. A small amount of corrosion-resisting steel also was used in 1931 for the spokes of automobile wheels. A new nickel-base alloy low in iron and containing chromium and combining strength and resistance to corrosion with facility of manufacture has been introduced. This alloy was developed particularly for the

Where Alloy Steel Went, 1927-1931

Percentage of Consumption by Groups

	1927	1928	1929	1930	1931
Automotive industry	75.07	79.67	61.40	62.23	72.67
Machine tool industry	4.73	2.65	6.34	8.95	6.17
Oil industry	1.25	0.87	4.07	4.73	1.16
Agricultural industry	0.89	0.49	4.05	5.94	3.30
Construction	0.95	0.60	3.72	1.00	1.09
Export trade	1.57	1.18	1.38	1.16	0.88
Railroads	1.77	1.17	1.02	2.66	1.83
Shipbuilding	0.35	0.28	0.22	0.79	0.52
Miscellaneous	13.17	13.09	17.80	12.54	12.38

manufacture of dairy machinery and is available in the form of sheets, bars, tubes and castings.

A long series of tests is said to have shown that under constant exposure in the high acid conditions of a buttermilk machine, 16-gage sheet of the material would lose less than half of its thickness in 300 years.

Much research work is underway to provide an alloy steel for steel turbine blades which will overcome the rapid erosion of the blades in the last rows of the unit. Tests show that a steel with about 12 per cent chromium and 0.10 per cent carbon is well suited to this application. Certain alloys containing nickel as well as properly heat treated stainless steels have given satisfactory service. Blades with the edges plated with metals of the erosion-resisting type now are being investigated and give promise of more efficient operation. Such coatings as chromium, sprayed tantalum, nitrided steel and stellite, are being tried and results indicate longer blade life under wet-steam conditions.

Favors Alloy Bars

About 300 tons of deformed bars containing 5 per cent chromium are being used for reinforcing the new concrete dam of the New-Canawha Power Co., Alloy, W. Va. The decision to order bars of this analysis resulted from tests which indicated that steel containing 5 per cent chromium has five times the corrosion resistance of plain carbon steel.

High elastic nickel steel recently developed in this country for shipbuilding purposes may be used in two superliners which have been designed for the United States Lines and which are expected to be built ultimately for North Atlantic service. Because of the high speed contemplated, a minimum weight is paramount in these vessels. Use of the new steel, it is calculated, would effect a savings of from 1000 to 1300 tons or about 4 per cent of the steel structure of each vessel.

Tests made by government metallurgists at the Watertown arsenal disclose an attempt to solve the manganese problem which faces the steelmaking industry. Experiments made at the Watertown arsenal show that a suitable grade of steel for the manufacture of guns can be made by substituting zirconium for manganese.

The recent development of tantalum carbide bonded with about 8 per cent nickel is looked upon with favor by the metal working industry for cutting tools.

A series of low alloy steels containing chromium, manganese and silicon has been developed in 1931. Most useful forms of the steel contain 0.40 to 0.60 per cent chromium, 0.70 to 0.80 per cent silicon, 1.10 to 1.40 per cent manganese with carbon ranging from less than 0.10 to 0.65 per cent, depending upon the application. These three elements in combination are said to result in high ultimate strength, great ductility, high fatigue limit, high impact strength, and ready machinability.

Manufactured by the open-hearth process, the steel can be used in the as-rolled or heat-treated condition. By selection of appropriate alloy percentages it generally is possible to obtain desired physical properties without heat treatment, or with a simple normalizing.

It can be rolled or fabricated with facility and welding is performed as for carbon steel of the same shape. Among applications for which the steel is claimed to be especially advantageous are ship plates and naval structural parts, buildings and bridges where a high strength-weight ratio is valuable, chimneys, pentstocks, pressure vessels, tanks, boilers, staybolts, and high-strength seamless oil-well casings.

How Alloy Steel Was Used, 1927-1931

Percentage of Consumption by Products

	1927	1928	1929	1930	1931
Hot rolled bars	75.62	81.70	61.87	70.50	54.48
Forgings	3.20	1.76	2.25	6.13	5.12
Hot rolled strip	1.38	0.95	4.43	3.86	1.31
Cold drawn bars	7.06	5.23	11.43	5.32	25.65
Plates	0.96	0.56	1.04	3.05	1.95
Pipes and tubes	6.60	5.93	6.33	8.84	8.60
Sheets	1.11	0.72	11.03	0.94	0.69
Tool steel	2.25	1.64	1.36	0.80	2.03
Structural shapes	0.16	0.18	0.12	0.42	0.07
Wire	1.50	1.19	0.05	0.08	0.06
Cold rolled strip	0.05	0.03	0.09	0.06	0.04
Merchant shapes	0.11	0.18	.....	.....	.....

Distribution by Percentage of Alloy Steel in 1931

Shown by Consuming Groups and Individual Products

Group	Hot rolled bars, per cent	Cold drawn bars, per cent	Sheets, per cent	Plates, per cent	Pipe and tubes, per cent	Wire, per cent
1. Automotive industry	81.39	73.71	0.16	35.05	86.26	95.24
2. Machine tool industry	5.76	2.56	19.86	4.24	.....	.....
3. Railroad industry	0.73	2.96	.....	20.54	.....	.....
4. Agricultural industry	4.35	0.80	.....	.....	7.68	.....
5. Construction industry	1.54	0.49	.....	0.57	.....	.....
6. Shipbuilding industry	0.04	0.77	0.48	0.71	.....	.....
7. Oil industry	0.37	0.82	.....	1.99	5.33	.....
8. Exports	0.58	0.62	2.62	0.14	.....	.....
9. All other requirements	5.24	17.27	76.88	36.76	0.73	4.76

Group	Structural shapes, per cent	Merchant shapes per cent	Hot rolled strip, per cent	Cold rolled strip, per cent	Tool steel per cent	Forgings per cent
1. Automotive industry	54.62	.....	59.65	.....	9.68	4.84
2. Machine tool industry	1.68	.....	13.90	100.00	58.26	14.65
3. Railroad industry	.....	.....	.....	.....	0.69	5.17
4. Agricultural industry	.....	.....	4.04	.....	0.33	.....
5. Construction	0.84	.....	.....	.....	0.24	2.03
6. Shipbuilding industry	5.88	.....	.....	.....	1.50	4.79
7. Oil industry	.....	.....	.....	.....	0.44	4.79
8. Exports	0.84	.....	20.30	.....	0.84	1.91
9. All other requirements	36.14	.....	2.11	.....	28.02	61.82

Radicals—Then, and Now

DURING the panic of 1893-94, Eugene V. Debs organized railroad workers, and a strike was declared, centering in Chicago. One of the many acts of violence was the burning of 600 freight cars, illustrated in Harper's Weekly, July 21, 1894. In the same year, "General" Coxey led his "army" to Washington. The communist "hunger marchers" brought to the nation's capitol in December, 1931, fewer men than in Coxey's "army." The photograph of the communists, at the right, contrasts the peaceful character of demonstrations today with those 37 years ago

Peace Prevails in Labor Adjustments; Industry Plans Employment Security

BY A. J. HAIN
Associate Editor, STEEL

UNEMPLOYED in the United States, as implied by the census phrase "out of work, able to work, and looking for jobs," now are estimated at 6,200,000. This is calculated from index numbers based on the census which revealed 2,429,000 unemployed in April, 1930.

The proportion of normally "gainful workers" who have fallen into this class has increased from 6.5 per cent to approximately 12.7 per cent. Two per cent of the population were unemployed when the census was taken; now, more than 5 per cent.

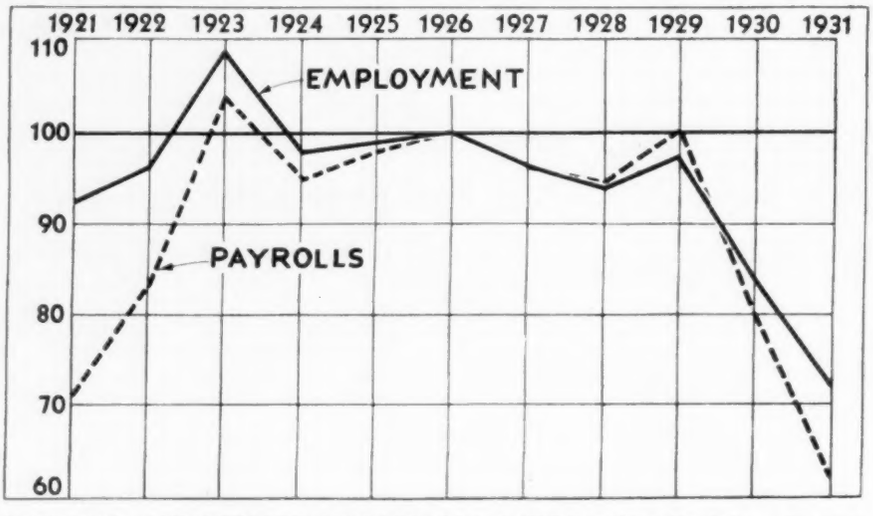
In addition, a large number are at work only part time, though there is almost a complete lack of specific information regarding the proportion of full-time hours they are engaged. "Volume of employment" is reflected to some extent in the federal index for the number on payrolls, which for manufacturing industries in October was 67.3, as compared with 97.5 for the year 1929, and 100 for 1926.

In iron and steel manufacture the trend has been almost steadily downward since 1929. The index which for October, 1929, stood at 94 dropped to 79 by October, 1930, and to 63 for the month in 1931.

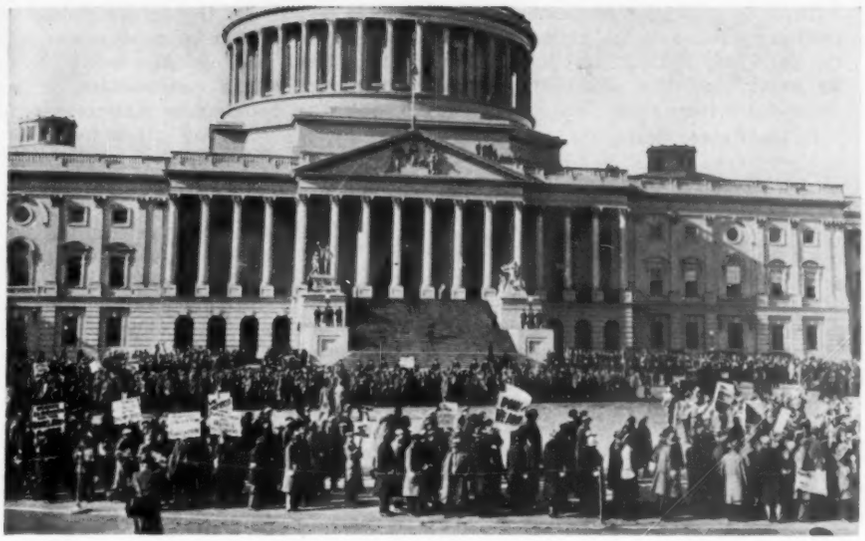
Increasing unemployment also has been the record throughout the greater part of the world. In Germany the number of registered unemployed in November, 1931, was 5,057,000, or 37 per cent more than in November, 1930; in Great Britain, 2,656,088, an increase of 17 per cent. Other countries reported increases as follows: Austria, 15 per cent; Czechoslovakia, 117 per cent; Italy, 64 per cent; and Poland, 24 per cent. France began to feel the world-wide depression, and the increase in the number of registered unemployed, receiving benefits, was 1783 per cent, though the actual number in November was only 92,157.

Regardless of the various reasons for unemployment in the United States no other development in recent years has so completely dominated national thought. Officially, from the President down to the village mayors, it has been considered necessary to appoint committees to provide jobs.

Unofficially, all the large business associations, and smaller units have grappled with the problem. Practically every employer has had to contend



PAYROLLS, AND NUMBER ON PAYROLLS LOWER THAN IN 1921: Indexes for 50 manufacturing industries, compiled by bureau of labor statistics



Wide World Photo

with it in some form. Scores of stabilizing plans have been formulated. Pamphlets and books beyond number, containing statistics, analyses, comment, and replies to questionnaires have appeared.

Unemployment assumed the importance of a national emergency, and in view of conflicting interests, the most significant feature has been the absence of serious strikes and disorder. Prolonged struggles, violent outbursts, stoppage of railroad transportation, and great property damage marked some previous depressions.

Labor tranquility has been due to the fact that the present depression was proceeded by an era of widespread and unparalleled prosperity; also that industry has subsided and adjusted itself gradually, letting its problems be well understood.

More than twice as many strikes and lockouts occurred when industry was humming in the four years prior to 1921, than in that year and the succeeding three. They reached a high point, 4450, in 1917, and dropped to 2385 in 1921. In 1930 the number, as reported to the bureau of labor statistics was only 653, and for the first nine months of 1931, 646.

"Hunger March" in Motorcars

Communism has not profited from experiences in the United States in the past two years. Its demonstrations have not been so large or so numerous as in 1928 or 1929. The "hunger march" to Washington in December, organized by communists, supplied with food, shelter and automobile transportation, from wherever the "marchers" would come, succeeded in assembling there only about 1500, less than "General" Jacob S. Coxey led on foot and by wagon 37 years ago.

The American Federation of Labor at its convention in August, 1931, reported a net reduction of 71,546 in membership, to 2,889,550, lowest since 1927. Its maximum number, in 1920, was 4,078,740. Building trades workers are being held together only by tremendous exhortation.

Wage rates in manufacturing industries were moving downward nearly two years before the United States Steel Corp. and other leading iron and steel manufacturers announced a 10 per cent cut, effective Oct. 1, 1931, the first general reduction since 1921. Prior to that, reports to the bureau of labor statistics indicated, the rates of only 34,000 iron and steel workers were lowered in 1930 and 1931.

Payrolls Reduced

Payroll totals in general manufacturing industries, as represented by the bureau's index, in October were little more than half their size in October, 1929. The index for the full year 1929 was 100; for the first ten months, 1931, 62; and in October, 1931 —53.7. In iron and steel manufacture the payroll total in October was 45.5 per cent less than in the same month in 1930.

While wage rates in manufacturing industries were being readjusted downward, those in the building trades appeared to be moving upward, for in the spring of 1931 the federal bureau's index was 276.3—compared with 100 in 1913— and 3.5 points above 1930.

Trade unions are endeavoring to hold their rates, as are the railroad brotherhoods, but so far less successfully, as from all sections of the country recently have come reports of re-

REASON TO BE THANKFUL: The steel industry has come through the past two years without a serious strike. In 1892 an attempt to cut wages of less than 100 men at Homestead, Pa., led several thousand into a long, bitter struggle. Illustration from Harper's Weekly, July 16, 1892 is captioned: "The Homestead Riot—Pinkerton men leaving the barges after the surrender." They were brought to Homestead from Pittsburgh on river barges, met with a volley of fire from strikers, surrendered, then were beaten and driven away

ductions being accepted by unions.

Construction work provided by congress, amounting to $2,500,000,000; another federal program calling for $3,000,000,000; state and local appropriations adding billions more, are piling up tax burdens. But industry has cause to be thankful so far that legislation has not dealt it a more dangerous blow.

Dole bills have been defeated so decisively wherever they have appeared as to leave no doubt of overwhelming public opposition. Measures for compulsory unemployment insurance have been voted down in the states, though in congress Senator Wagner, New York, has revived his plan for state unemployment insurance, aided with $100,000,000 of federal funds.

In Wisconsin, Governor Philip La Follette is urging a redistribution of public wealth, and is "giving" industry until July 1, 1933, "to put its house in order," or the alternative, compulsory insurance.

In the United States senate, Philip's brother, "Young Bob," has proposed the establishment of a national economic council by the co-operation of various private associations, to study changing economic conditions, and methods for regularizing employment.

But, notwithstanding the accumulating force for so-called social legislation, there probably is more public concern today than ever before for the safeguarding of industries—a more general appreciation of industries' problems.

Industrial leaders could not be expected to be fully united at this stage on a course for the future protection of employes from unemployment. The disposition undoubtedly is to accomplish something constructive, in accord with progressive American principles, but so many plans have been presented in a field in which there has been little experience, the tendency is to be cautious.

This accounts for the seeming lack of unity, though industries are progressing toward an understanding and practical solution of their problem. They are opposed, almost as a unit, to insurance under government compulsion.

Next are the proposals for insurance to be written by old-line insurance companies; individual company insurance plans; insurance by groups of companies engaged in similar lines of manufacture; and, insurance by groups of companies in the same communities.

The foregoing is the order of desirability in which they were arranged recently by employers in a large middle western city; but those in other cities will select them differently, some preferring above all the community plan.

Plans contemplating more extensive readjustments of the industrial system are receiving relatively less consideration. Of the ten outstanding economic stabilization systems proposed, all but one provides for some modification of the antitrust laws, to permit a closer and more flexible association of industries. All but two provide for government regulation.

Antitrust Amendments Opposed

Whatever merit these plans possess, their adoption appears more remote as opposition to modification of the antitrust laws and to regulation by the government increases.

Antitrust laws cannot be amended for the benefit of industry without extending the same degree of freedom to organized labor, thereby incurring the risk of surrendering all that has been accomplished in making labor amenable for acts of injustice.

Following the steel strike in 1918, and the depression in 1921 many plans for employe representation were proposed; some adopted, and applied to several million workers. Enthusiasm for them has waned, among employes themselves. In many instances they are no longer functioning. High wages, steady employment, and employe stock subscriptions, in the long run proved more potent than works councils.

Now we have new plans, more basic, and far-reaching. It is probable that the most practical features will be tried, and as experience progresses they will be improved, and become as much a part of our industrial regime as accident compensation. And thus the sense of mutual responsibility, and mutual interest will be promoted. A good start already has been made toward gaining the experience.

Four Man-Hours of Direct Labor in Ton of Open-Hearth Steel

APPROXIMATELY 4.14 man-hours of direct labor are sufficient to produce one gross ton of open-hearth steel. By direct labor in this instance is meant that which is engaged in mining the necessary amount of iron ore and coal, quarrying the limestone, converting the coal into coke, operating the blast furnace and the open hearths. It does not include the transportation of the raw materials, or handling of scrap outside the steel plant.

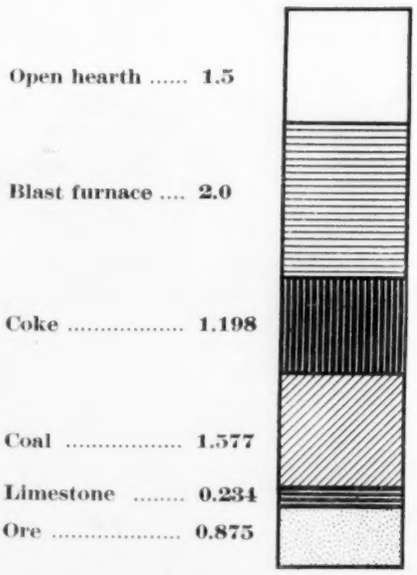
It requires approximately 5.88 man-hours to produce the materials for and to manufacture a ton of pig iron, less time than it takes to make a ton of steel. As about 45 per cent of the open-hearth charge is pig iron, and 55 per cent scrap, the working time for the necessary amount of iron is only 2.64 man-hours. Added to 1.5 man-hours per ton of steel at the open hearths, this gives a total of 4.14, from raw materials to ingot.

The following table shows the number of man-hours required in producing one ton of each of the materials, the amount of the materials used, and the corresponding time:

	Man-hours, gross ton	Materials used, pounds	Time in man-hours
Coke	1.45	1850	1.198
Coal	1.30	2719	1.577
Limestone	0.50	1050	0.234
Iron ore	0.50	3920	0.875
Total			3.884

To this must be added two man-hours as the average time required at the blast furnace to produce one ton of pig iron, the total being 5.88.

STEEL recently obtained actual averages for iron ore, coal, limestone, blast furnace and open-hearth labor from several large companies, and these were checked with theoretical and practical averages as previously determined by a firm of well-known engineers. It is not assumed that the figures are precisely representative of the steel industry as a whole, but they will serve well for comparison. STEEL invites correspondence and information which will make them more comprehensive.



Man-hours for producing materials and making a ton of pig iron and steel

It will be noted that the total direct labor when using 55 per cent scrap—4.14 man-hours—is little more than half the 7.38 man-hours which would be required if no scrap were used. Another article bearing on the relationship of scrap to steel, pig iron and iron ore begins on page 143.

Ingenuity Helps Industry To Capitalize Depression

HARD times are hard on hard losers. Executives who cling obstinately to the methods of 1928 and 1929 are finding it is practically impossible to make headway under present conditions. The most enviable records are being made by those who have the faculty of adapting their policies to the requirements of the day most promptly.

As a general rule it may be said that the average small company can adjust its activities more quickly and more easily than its larger contemporary. In personnel, plant and equipment it should be faster on its feet than the corporation burdened with many nonproductive departments, extensive raw material reserves, etc.

Opportunity to make a good showing in the face of the depression also varies according to the character of businesses. Producers whose entire income is derived from the sales of a plain material such as cement, stone, brick, tonnage steel, ordinary castings, etc. are more severely handicapped than manufacturers of finished products. Companies whose product goes to industrial companies for fabrication or manufacture into finished articles do not enjoy the flexibility that is accorded companies who sell direct to the public. Builders who sell equipment involving extensive engineering service have a problem quite different from that of manufacturers whose product requires little or no service of this kind.

In view of the broad variations in opportunity depending on the situations faced by each type of industrial enterprise, it is unfair to consider profits of 1931 as an accurate criterion of management. Not all of the remarkable achievements resulting from exceptional executive direction are to be found in companies whose earnings are holding up well or are increasing. Some of the most heroic feats of managerial skill are being performed for corporations still operating in red ink. To hold a deficit to a few thousands of dollars when it might easily have exceeded several millions sometimes is more of an accomplishment than turning a moderate loss into a profit. For this reason the so-called "success" and "prosperity" stories now appearing in the magazines do not give a true picture of what is going on in business. They ignore the dramatic battles being waged by management against tremendous odds—battles in which the flag of victory cannot be hoisted until the last trace of hard times has disappeared.

* * *

Attitude of Management Important

A careful study of the methods being pursued by many companies shows that the attitude of mind displayed by executives has a direct bearing upon the degree to which the company is weathering the storm. There are presidents who refuse to change their course. They are continuing to buck the depression head on. They are like oarsmen trying to make progress upstream against a current that is too strong for them. Their energies are being dissipated in blind struggle against a superior force which they do not understand.

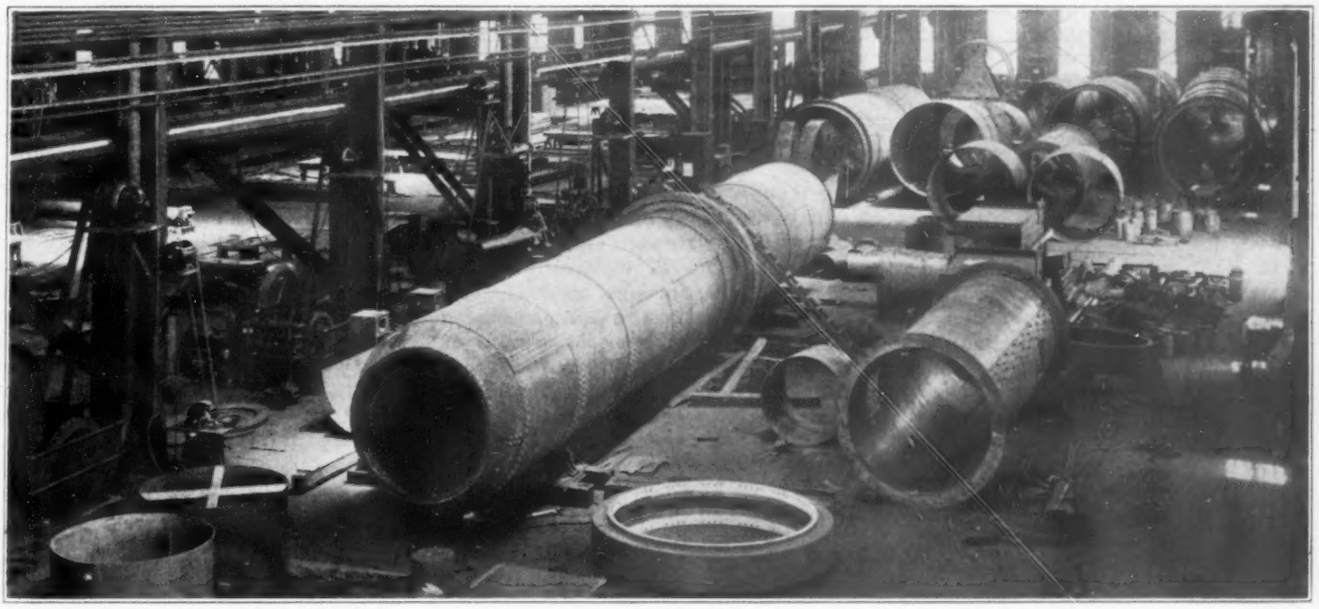
On the other hand there are presidents who, having studied the depression and appraised its threat at true value, are resorting to strategy instead of blind strength. Instead of battling futilely against the current they are riding with it and are actually utilizing part of its power to help carry them to a safe landing. To executives of this type, the depression is an opportunity.

This difference in attitude was illustrated by a writer in *Magazine of Wall Street* who quoted a farmer whose fields had just been swept by a horde of grasshoppers:

"Well, they took most of my crops, but I've gathered about 10 tons of the critters—got 'em stored in the barn and they will make first class food for my chickens this winter. Figure I'll come out ahead on that."

Those who have made progress in spite of hard time are those who like the farmer have used their wits to find opportunity in the situation confronting them and are proceeding to capitalize it. The ingenuity displayed by management in turning the by-products of adversity to its advantage sometimes is amazing.

A sand company suffered a serious shrinkage of sales because steel foundries constituting its chief outlet were curtailing operations. For years sand for molds and for sandblasting was demanded in sufficient volume to support the company's pits



Fabricating, finishing or manufacturing establishments not burdened with extensive non-productive plant and organization can adapt their activities to changing conditions quickly

and plants at a fair rate of activity. The depression forced the management to seek other uses for its sand. Fortunately a certain grade of sand, previously discarded as worthless, was found to be ideally adapted to use as an ingredient for fine concrete floors in buildings. Moreover the price per ton obtained for sand purchased for this purpose was somewhat higher than that received for foundry molding sand. Adversity helped this company to find a market for a commodity that heretofore had been a liability rather than an asset.

A well known manufacturer of metal and wood cutting saws, threatened with serious loss of business through shrinkage in its industrial sales, brought out a line of popular-priced saws. Within three weeks after the new product had been introduced 600 employes previously laid off or working on short time were restored to steady employment.

Similar action by a manufacturer of builders' hardware, who introduced a line of lower priced goods and advertised it aggressively, resulted in a marked increase in sales in 1931 over 1930.

Several foundries engaged almost exclusively in producing castings for industrial use recently have tried the experiment of selling cast novelties on a retail basis. A number of stamped and pressed metal products manufacturers are attempting to sell card tables, chairs, etc., to the public by direct mail. The results of these tentative excursions into direct merchandising are not yet clearly defined. However the efforts in this direction illustrate the eagerness with which many company executives are exploring new markets and experimenting with methods of distribution hitherto untried by them.

The officers of a steel company that has gone through several major depressions believe that improvement in product, equipment or service, if inaugurated at the proper time, will help a company to emerge from hard times in a stronger position than ever. On one occasion in the past, this company improved its product so that when the clouds of depression lifted it had a marked advantage over its competitors. During another period of restricted demand it installed equipment which helped to win broader markets when business returned. During the present slack period the company has entrenched itself firmly in several new developments which promise to place it in a highly advantageous position when business picks up.

Another steel company enjoys the enviable record of having increased its sales in 1931. Two years ago this concern had 9 per cent of the business in its field; today its share is 16 per cent. This achievement is credited entirely to a sales policy in which service to the customer takes precedence over price. The company has not reduced its sales force. On the contrary, at the beginning of 1931 it guaranteed full time employment to its salesmen for the year.

Builds Goodwill

A manufacturer of warm air furnaces is utilizing the period of depression to build goodwill and to accumulate vital market information for the future. About 3000 employes of the company are making a house-to-house canvass, offering to make an inspection of the furnace, touch up rust spots, lute cracks in furnace shells, and make other minor repairs—all gratis to the owner. This affords employment to many, furnishes the company with an accurate inventory of future sales opportunities and builds goodwill—all of which should prove of great value.

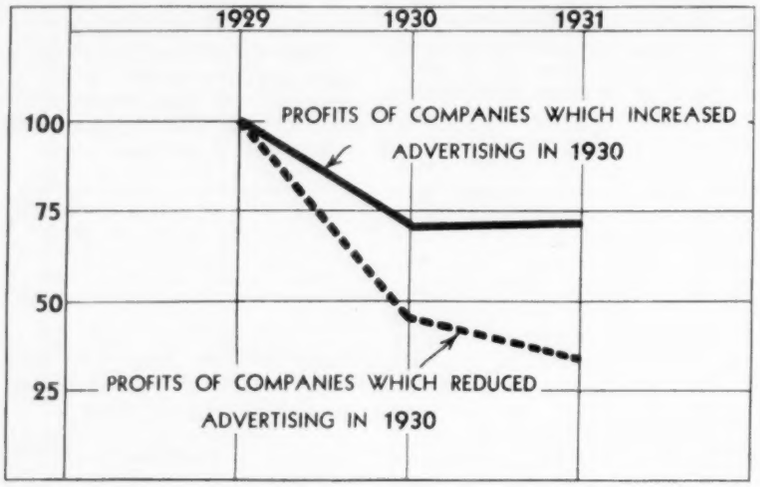
While many concerns have sought new business by bringing out popular-priced goods, there are a few exceptions. A manufacturer of piston rings improved its product, packaged it more attractively, distributed it more effectively, advertised it more extensively and increased profits 34 per cent in the first half of 1931 in spite of the fact the improved ring was introduced into the market at a price 10 cents higher than the highest priced ring previously sold.

Ability to foresee demand for products in specialized markets is rewarding many companies. One of the most successful refrigerator manufacturers—a field in which sales in 1931 exceeded those of 1930—saw the opportunity for gasoline motor driven refrigerating equipment on farms beyond the limits of central station power and on railroad refrigerator cars and on motor trucks.

An equipment builder, recognizing the trend toward the welding of machinery parts, is developing a line of equipment for handling parts in process of fabrication by welding. He is the forerunner to the weldery of the part played by the foundry equipment manufacturer in relation to the castings industry.

In every case in which a company is strengthening its position under the present difficult circumstances, the credit can be traced to the ingenuity of someone in executive control. Never has the need for clear thinking and courageous action been greater, yet seldom has the reward been more enticing.

How Advertising Influences Profits

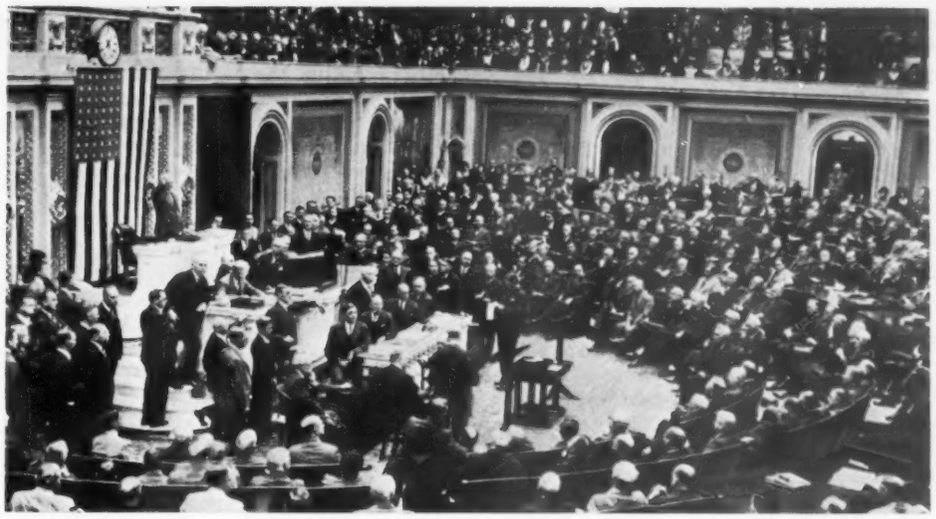


"This study included a summary of all advertisers whose records were available. There was absolutely no selection of favorable cases. . . . There were 97 companies on the list. Sixty-two of them actually spent more for advertising in 1930 than in 1929. The remaining 35 companies reduced their advertising in 1930.

"The point is in what happened to profits. Being more or less typical, the average profits in both groups declined. . . . In the group which decreased advertising profits declined 55 per cent in 1930. In the group which increased advertising earnings declined only 29 per cent. . . .

"Now let us see what happened to these same companies in 1931. So far it has been possible to get reports on 63 of the 97 companies indicating what profits will be for 1931. . . . . The group which increased advertising in 1930 actually is earning 2 per cent more profit in 1931 than in 1930. The group which reduced advertising in 1930 suffered a further shrinkage in profits, their 1931 earnings being fully 25 per cent below 1930."

—*Advertising Federation of America*



When congress convened Dec. 7 it elected a Democratic speaker for the first time since the Wilson administration. The speakership is a "plum" but the real power is in the committee chairmanships, which also passed to the Democrats. The Republicans retain nominal control of the senate

Congress, Erratic and Hostile to Hoover, Is Arbiter of Business Relief

BY LYNNE M. LAMM
Washington Editor, STEEL

BUSINESS and prohibition are the vital issues before the United States today, and on them, it appears probable at this time, most debate at the present session of congress and the presidential election of 1932 will turn.

Except for the bearing which the cost of enforcement may have upon federal expenditures and thus indirectly on federal taxation, prohibition is largely an academic question for the steel industry.

Spotlight Now on Congress

But business includes unemployment and proposals for its relief, taxes, the tariff, immigration, the railroads, war debts—practically everything economic.

For relief and guidance in the present distressed business situation the country thus far has looked to the White House. It may be presumed that the President and his cabinet have left nothing undone or unproposed which—according to their lights—might have alleviated conditions.

Now the spotlight is shifted from the White House to the Capitol. Whatever further is done for business or to business will emanate from congress. While the President's powers of approval or veto are impressive, yet the initiative has passed to congress.

Only time will disclose whether or not this is fortunate for business, but the fact that a presidential election is in the offing makes politics a silent partner of both political parties.

In the house the Democratic party is in control. Its members lead every committee, will frame practically all legislation. In the senate, the Republican insurgents hold the balance of power. Therefore, congress may be considered hostile to the President.

This combination of circumstances surrounds every measure with the greatest of uncertainty—uncertainty whether the bills passed by a Democratic house will survive the mixed senate, and if the negotiate this ordeal, uncertainty whether they will be decapitated by the Hoover veto. It would seem assured that no measure can be passed over the veto.

Congress has been sobered by its responsibility. Its members are fresh enough from their constituencies to be aware of the plight of industry. Democrats have set up a policy committee of ten members of the house and senate to assist in formulating important bills. But the lack of party responsibility bodes ill, and Washington can see a deadlock on Capitol Hill obstructing genuine relief.

Safeguard Federal Reserve Banks

Probably the most important measure looming before congress is that which would create the Reconstruction Finance Corp., designed to thaw frozen bank credits and free money for legitimate business purposes, and resembling the former War Finance Corp. There appears to be general agreement concerning the necessity for some such proposal—always provided the bars are not let down on the federal reserve banks.

Increased taxes are a foregone conclusion, but where their incidence will be greatest is moot. The Hoover-Mellon proposal to revive the 1924 revenue act, including higher normal income taxes and doubling the surtax to 40 to 46 per cent on annual incomes in excess of $100,000 is meeting serious Democratic opposition.

Democrats Favor Borrowing

The Democratic leaders who have thus far expressed themselves are partial to more borrowing than Secretary Mellon would sanction; they would raise income tax rates in the higher brackets sharply, but would avoid the many so-called nuisance taxes.

At best, the federal treasury will be unbalanced almost $2,000,000,000 by the conclusion of the current fiscal year, and a large portion of this sum must be raised by taxes. It would be a feat if an agreement were reached in time to apply new rates to tax returns due March 15 for the calendar year 1931.

There is considerable difference of opinion whether this session of congress will accomplish anything for the railroads other than to offer financial assistance through the Reconstruction Finance Corp. or some similar measure. Senator Couzens, of Michigan, chairman of the inter-

state commerce committee of the senate, has introduced a resolution providing for appointment of a joint committee to investigate the railroad situation, but although favorably reported out by the committee the measure has thus far failed of passage.

The house committee on interstate and foreign commerce will consider at an early date a resolution by Representative Rayburn, of Texas, providing for an investigation of holding companies, including railroad as well as public utility interests.

The interstate commerce commission's annual report, among other things, suggested the basis for an investigation of competitive conditions between various transportation agencies. One objective would be to determine how far air services are subsidized by the government and whether transportation should not be put on an equal competitive basis.

Early consideration is expected in the house on the question of railroad mergers. Because of the practice of dual control of companies, which has grown in recent years, the effectivness of the present law designed to expedite the consolidation of the roads into a few great systems has been lost. There are some fears railroad wage discussions may open the matter of federal ownership.

More Tariff Talk Than Action

The chances favor more tariff discussion than legislation. Both parties are loath to open up such a controversial subject just preceding an important election. Petroleum and copper interests are active in promoting greater protection. Several bills have been introduced to prohibit the importation of manganese ore from Russia. The present tariff may be safely expected to continue through this year, and should the November election place a Democrat in the White House, the tariff presumably would not be revised until a special session, beginning in the spring of 1933.

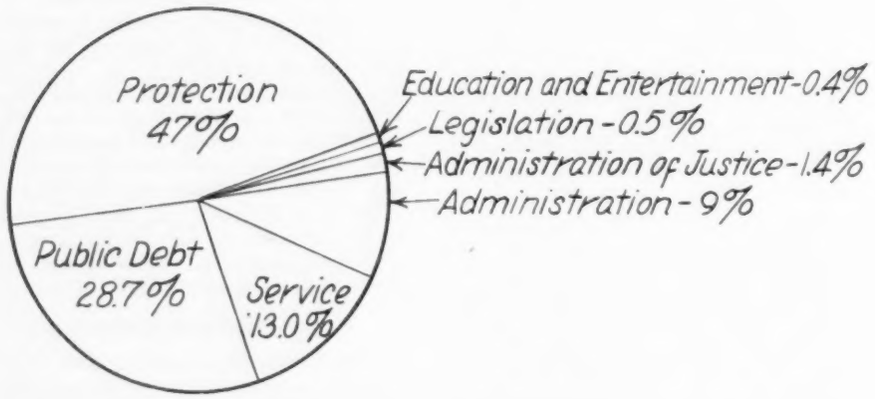
An important bill introduced by Representative Tinkhan, of Massachusetts, would greatly enlarge the scope and authority of the federal trade commission. It would clothe the commission with authority to render "advance" opinion on mergers and policies of business procedure submitted to it.

The commission also would like congress to revise its enabling act to remove the numerous doubts cast upon its authority to make investigations at the request of congress or the President.

Closely allied with these proposals are the various recommendations that the antitrust laws be liberalized. Already, several bills have been introduced at this session. The proposal of Senator LaFollette that a national economic council or commission be set up, on which hearings were held last summer, has culminated in a bill. Business leaders who testified before the committee were almost unanimous in opposing this.

The present session of congress is the long one. With the Republican convention scheduled to convene June 12 at Chicago, it seems likely that adjournment will precede that event.

Cost of Federal Government Now $150 Per Family Per Year



FIFTY cents a day for every working day—this is the approximate average cost to every American family for the conduct of the federal government's affairs in the next fiscal year, as represented in President Hoover's budget. Some families will pay more, some less, some nothing, but a simple calculation shows the President's estimate of government expenditures—$3,943,000,000—amounts to $150 per family per year, assuming 4½ persons per family.

Alone, this tax bill might not be so burdensome, but state and local taxes in many communities add approximately $1 more, making it $1.50 per family, every working day.

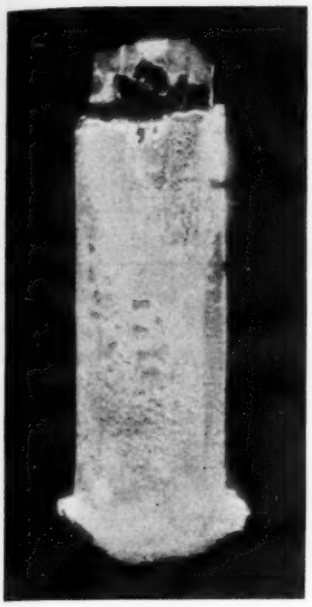
By far the largest federal expense is "protection," the $1,840,000,000 required for the next fiscal year constituting 47 per cent of the budget. In this division are such items as $423,940,000 for the war department, $343,000,000 for the navy, $1,072,000,000 for veterans' relief administration.

The public debt requirements — $1,136,803,000—make up 28.7 per cent of the budget; service, with $515,339,000, being the third largest division, amounting to 13 per cent of the total. In this latter group are such items as $197,454,000 for the department of agriculture; $44,719,000 for the department of commerce; $70,627,000 for the department of the interior; $14,488,000 for the department of labor. The assistance given agriculture exceeds the expense of the postal department—$155,000,000.

Legislation, often assailed as an extravagance, requires only $21,856,000, or 0.5 per cent of the budget; the administration of justice, $55,900,000, or 1.4 per cent; and education and entertainment, $18,209,000, or 0.4 per cent. Of this, $10,000,000 is given to vocational education.

Tax problems—federal, state and local—are assuming vast significance in view of present economic conditions. Federal expenses have been pared considerably by President Hoover, and he has prevented raids on the treasury for various purposes which would add many millions to the federal budget; nevertheless, the expense and the returns to the public from many bureaus and departments, are being scrutinized as never before.

Appeals for the unemployed opened wide the floodgates of state and local funds in the past two years, running up the general average in many instances to double or more than double the federal tax. A considerable portion of this tax is of a continuing character, such as for public improvements, for which long-term bonds were issued, and therefore cannot be reduced, as in the case of administrative departments at Washington.



Steel ingots and castings in 1931: 25,597,000 *tons*

More Iron and Steel Than Iron Ore

PRODUCTION of Ingots and Castings Alone Rivals Mines' Output in 1931—Narrowing Margin, Due to Scrap, Results in Drastic Curtailment—Five-Year Ore Tonnage Now Less Than 15-20 Years Ago

Total iron ore in 1931: 25,000,000 *tons, estimated*

FOR the first time in history, iron and steel production in the United States in 1931 appears to have exceeded that of iron ore. The estimate for steel ingots and castings, 25,597,000 gross tons, is larger than that for ore, 25,000,000 tons, and when the final figures become available they may show steel alone surpassed mine output. If merchant grades of pig iron be added to steel, the scales are tipped against ore.

This is a rather remarkable manifestation of the important changes in recent years in the relationship between these products, due to the increasing use of scrap. Iron mining was restricted more drastically than iron and steel manufacture, but the normal margin has narrowed: otherwise not even the events of 1931 would have so unsettled the ore industry.

If the same margin or ratio between ore and iron and steel had been maintained in the past five years as the average in the five years from 1912 to 1916 it would have been necessary to have mined 87,000,000 tons more ore, an amount considerably larger than shipped in any one year by Lake Superior producers.

In this instance, the competition from scrap is a reminder that the country is growing older and more experienced industrially. It is learning how to conserve its resources and to employ them to better advantage.

Balancing Scrap and Ore

THIS competition would be considered a wholesome influence by the mine operators, if it did not thrust upon them serious problems concerning investment, development and operations. At the same time as steelmakers are compelled by sheer force of circumstances to use scrap, their iron mine subsidiaries find it increasingly difficult to keep capacity engaged sufficiently to pay taxes, royalties and other costs.

The custom of planning in advance a year's program for mine operations, to be followed almost without deviation, with the knowledge as to the approximate amount of ore that will be required, has encountered too many uncertainties in recent years. Iron ore requirements have become sensitive to scrap volume and prices, in addition to fluctuations in the rate of iron and steel manufacture.

In view of the consistent upward trend in demand for steel it has been considered good policy to expand steelmaking capacity. But can the same be said of Lake Superior mines?

Steel ingot and casting production has increased 36 per cent in the past 20 years, stepping up in each of the 5-year periods. Output of pig iron and ferroalloys has risen 10 per cent. Iron ore production in the United States has been reduced 3 per cent.

Midway in this span of 20 years the Lake Superior mine development was pushed to its highest point, to supply if necessary 100,000,000 tons in a season, while demand in the boom year, 1929, called for only 66,000,000 tons; and in 1931, 23,500,000 tons. The opening of mines, and their mechanization proceeded apace, while the use of scrap was making significant inroads, and the increase in the rate of steel production was tending to slow up.

FUSING yearly production figures into five-year periods, and comparing results, is somewhat like examining a rapidly moving machine with a device which appears to slow up motion. Long-range trends become more apparent.

Charts on the following page show iron ore production has declined, and the increase in the rate of iron and steel output has diminished in the past 20 years.

The 234 per cent increase in ore, and 349 per cent gain in steel from 1892 to 1911, with the further temporary stimulus of the war, unquestionably led the ore industry, if not steel, to over-development. Increasing use of scrap has reduced ore demand; mine capacity probably is double requirements.

Steel production in these last 20 years has increased only 36 per cent; pig iron and ferroalloys, 10 per cent. Though we may be headed toward another "boom," these barometers suggest caution in expansion of iron and steel plant capacity.

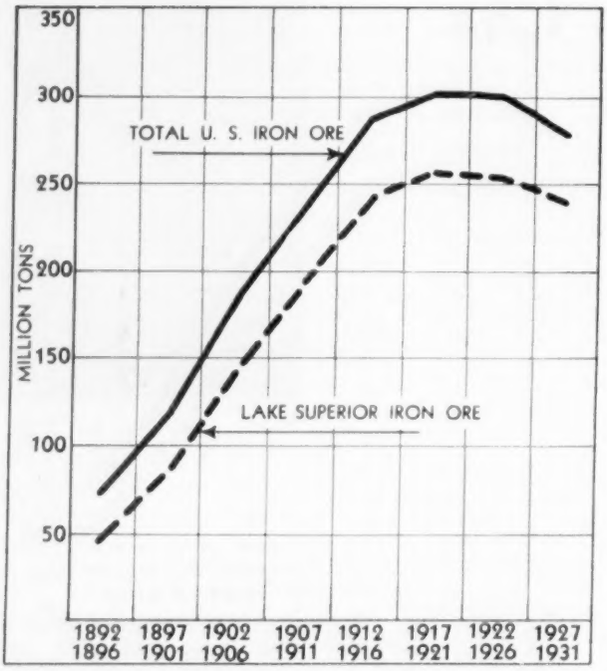
Capital Displays Confidence

TREND lines which producers projected from past years' performances gave an exaggerated picture. It was on the basis of such calculations that several million dollars were invested in a magnetic iron ore sintering plant on the Mesabi range—by capitalists who understood mining—a plant which has been idle almost from the time of its completion eight years ago. This was merely one of many examples of "over development"—the evidence of capital's confidence, and willingness to build, perhaps too soundly, for the future.

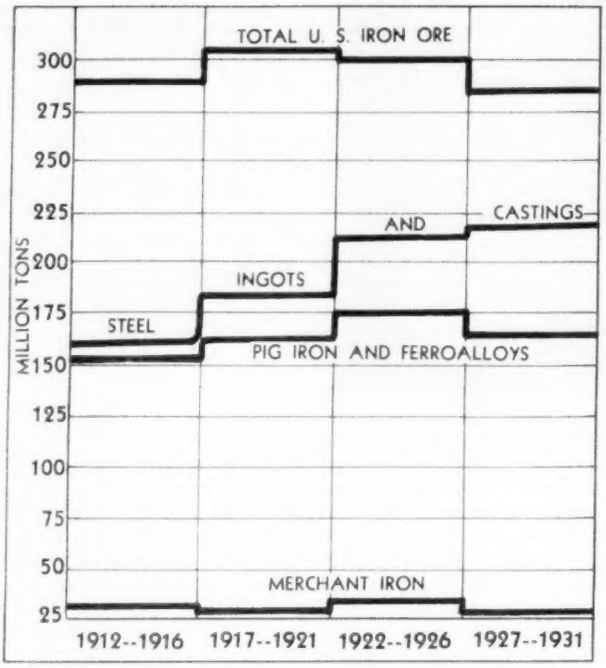
In the 20 years—1892 to 1911—ore output in the United States increased 234 per cent, and in the Lake Superior district, 333 per cent. In the 20 years—1912 to 1931—the country's output declined 3 per cent; and the Lake Superior district's 0.3 per cent. This is comparing the totals for the

Iron Ore, Pig Iron, and Steel Output in 5-Year Periods

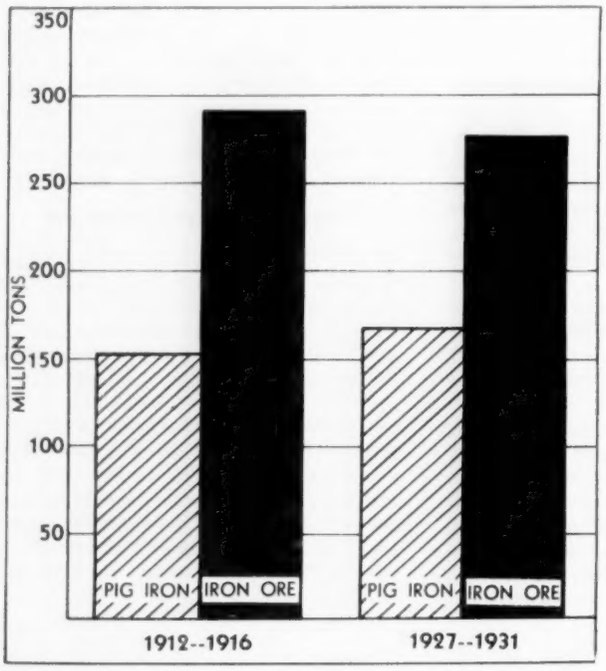
(A Page of Significant Charts)



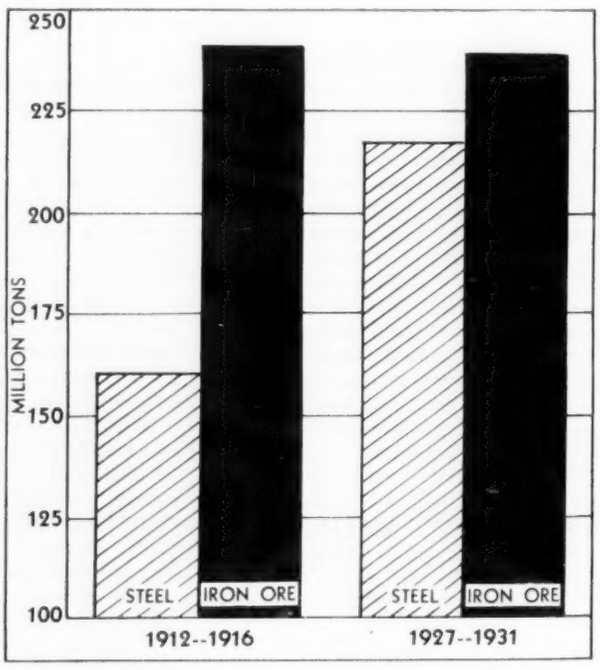
In the 20 years—1892 to 1911—iron ore production in the United States increased 234 per cent. In the 20 years—1912 to 1931—it decreased 3 per cent. This is comparing totals for five-year periods at the beginning and the end of each 20 years



Relative position of merchant iron (foundry, malleable and forge), all pig iron and ferroalloys, steel ingots and castings, and iron ore. Steel output in these 20 years increased 36 per cent. In the preceding 20 years it gained 349 per cent



Production of all grades of pig iron and ferroalloys, and iron ore in the United States. Pig iron and ferroalloys increased 10 per cent, while ore decreased 3 per cent, due mainly to more general use of scrap in blast furnaces, as well as in open hearths



Output of Lake Superior iron ore, and steel ingots and castings. Clear evidence of the diminishing ratio of ore to steel. Lake ore production in the past five years—240,955,000 gross tons—was only 10 per cent more than the 218,756,000 tons of steel

five-year periods at the beginning and at the end of each of the 20 years, thus eliminating short-range variations.

Having soared like a rocket in the first 20 years, production reached a certain strata in which it has leveled out. The trend has been downward in each of the past two five-year periods. These have included some of the heaviest iron and steel production years, and theoretically, according to the old formula, 1.85 tons of ore to 1 ton of pig iron, ore production should have advanced. Less Lake Superior ore was produced in the past ten years than in the preceding ten.

Steel Continues To Move Up

What was iron and steel doing, to lead on the industry? During the first 20 years when ore production was making its most spectacular gains, steel likewise was racing ahead. The country was producing 350 per cent more steel in the form of ingots and castings at the close of that period than at the beginning. And in the past 20 years steel has continued to move up, somewhat slower, but nevertheless without a slip in any of the five-year periods.

Considering these last twenty years, production of pig iron and ferroalloys increased in the first three 5-year periods, but declined slightly in the fourth. In the past five years, as stated, it was 10 per cent higher than in the five years, 1912-1916.

How could this happen, when iron ore, the primary source, dropped 3 per cent in the same time? This, too, is largely a reflection of the intrusion of scrap, though improved furnace practice has been a contributing factor. Quality of ore has remained fairly constant.

In its Jan. 1, 1931, issue, STEEL presented an extensive table showing the yearly ratios of ore consumption to iron and steel production, taking the latter as a group composed of steel ingots and castings, merchant grades of pig iron and ferroalloys. Further analysis confirms what has been stated regarding the consumption of scrap in blast furnaces.

The ratio of ore to pig iron and ferroalloys in the five years—1912 to 1916—was 1.859, and in the past five years it was 1.782. This indicates a conservation of at least 14,200,000 tons of ore.

The greatest saving, however, has been in the steel plant. Comparing five-year periods, the ratio of ore to iron and steel has been reduced from 1.47 to 1.16, indicating that 86,669,000 tons less ore was consumed in the past five years than if the ratio had not been disturbed.

Steel production up 36 per cent; iron and steel, as a group advanced 29 per cent; all grades of pig iron and ferroalloys up 10 per cent—iron ore output down 3 per cent! What does this signify to the ore industry? What is the long-range view?

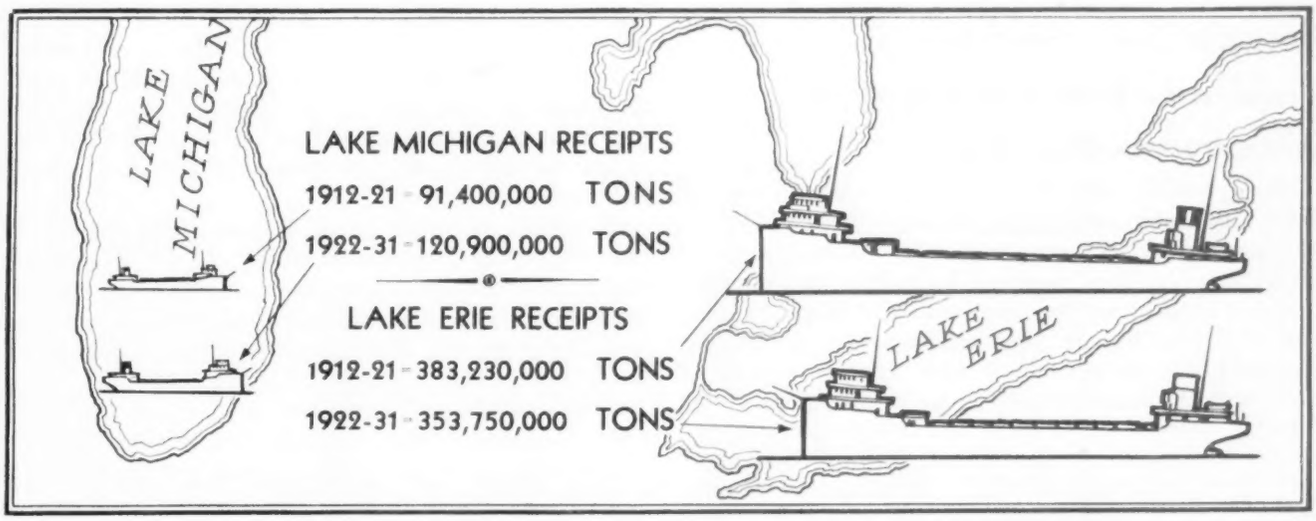
Despite the poor showing in the past 20 years, the long-range trend in production undoubtedly is upward. Ore has experienced the impact of scrap, but the proportion of scrap cannot continue to increase as it has in the past. In fact, it is believed by steelmakers to be near the limit. Therefore, larger steel demands will carry production to higher points.

After all, the mining of ore is the mining of iron, and when less iron is extracted with every ton of material, more material will have to be moved. This will increase volume, but there is scant consolation in volume attained to compensate for lower quality, as this will require the additional and costly step of concentration, putting scrap in still better competitive position. The use of steel, however, is steadily growing more diverse. New and innumerable products will tend to disperse scrap.

Outlook for 1932

To be as specific as possible: Assuming iron and steel production in the next ten years moves up as it did in the past decade, and that the ore ratio remains as at present—ore production in the United States to satisfy that demand will average 69,270,000 tons. It has actually exceeded that figure five times in 16 years. Production of lake ore would average 60,100,000 tons, a figure exceeded six times in 16 years.

Though lake ore stocks were not reduced as much as desired in 1931, the outlook is for a gain in shipments this year. Even though there be only a moderate increase in demand in 1932, it must not be forgotten that shipments this season must include requirements for the first four months of 1933—and that we are heading into years of larger production in ore, iron and steel.



THAT westward drift in iron and steel manufacture, commented on frequently in recent years, here is visualized in respect to iron ore. It is insufficient to say receipts at Lake Michigan ports in the past ten years increased 35 per cent over the preceding ten, and those at Lake Erie ports decreased 7 per cent. After all, Lake Erie's still are nearly three times as large as Lake Michigan's. Ore received at Lake Erie ports feeds lake-front furnaces and spreads to a wide expanse of industrial territory in Ohio and Pittsburgh, while Lake Michigan's receipts are consumed mainly at South Chicago, Indiana Harbor and Gary. South Chicago in 1931 received more ore than any other lower lake port, the first time the lead was taken away from a Lake Erie port, an interesting, but transitory phase. In the order of receipts in the past ten years: Cleveland, Ashtabula, Conneaut, O., and South Chicago. Ashtabula's receipts are down 14 per cent from the preceding ten years, a reflection of the recession in merchant iron output in the valleys. Conneaut, port for Pittsburgh, is up 6 per cent; Cleveland up 5 per cent, and South Chicago up 12 per cent.

EDITORIAL

A Fine Record, with a Single Blemish!

THE old law of inertia applies in business just as it does in physics. Individuals, companies or industries continue along in a rut—just as matter persists in its state of uniform motion in a straight line—unless influenced by other forces.

Because the steel industry is large and ponderous, the power of its inertia is tremendous. This is unfortunate because the ability of an industry to function effectively depends to a considerable extent on its capacity for adapting itself to changing conditions. In this period the handicap suffered by the steel industry in not being able to free itself from the bondage of inertia as readily as many other industries has been strikingly apparent.

No one will deny that many drastic changes in the industry would be beneficial. If you would prove this to your own satisfaction, try the following experiment:

Imagine yourself in the role of a benevolent dictator, endowed with absolute power to wipe out the existing American steel industry at a single stroke and to replace it with one conforming to your conception of the ideal.

Visualize the Ideal Steel Industry; It Differs from Existing One

The perfect industry of your making would differ in many important respects from the existing one. Furnaces and mills would be redistributed. The ratio of capacity to requirements would be corrected—not only in geographical districts but in the country as a whole. Ironmaking, steelmaking and finishing capacities would be brought into proper balance. Dozens of existing sites of blast furnaces, steelworks and mills would be abandoned and certain new ones established. Most of the obsolescence in equipment would be wiped out. Excessive provisions for future requirements in certain raw materials would be corrected. The capital structure would be revised.

Of course the ideal cannot and will not be realized by this or any other method. In our democracy we adhere to the policy of individualism, preferring it with its admitted weaknesses to the dictatorship of a Mussolini or Stalin. Nevertheless much can be done to improve the status of steel in America if those qualified to do so will visualize the ideal and then strive to mould the industry into that pattern.

Leaders in steel never were in a better position for effective guidance than they are today. The disciplinary influence of hard times now is at its height. Those executives who were propelled into rashness by foolhardy ambition, greed, or the belief that trick financial manipulation could take the place of good old fashioned business sense have retired or are in a chastened mood. Those entrusted with management are more willing to listen to reason.

Obtaining Proper Compensation for Product And Service Is Steel's Big Problem

They should give sober thought to the fact—established on page 125—that steelmaking facilities have been increasing twice as fast as steel production. This serious condition should lend strength to the often repeated warnings of Messrs. Schwab, Farrell and others against the danger of over-expansion.

Intensive study of steel's obligations to the nation in the matter of service should be initiated. Steel producers have virtually guaranteed to steel consumers absolute protection against interruptions in the supply of their product for generations to come. They have done this at the expense of staking out tremendous reserves of ore, fuel and other raw materials; of maintaining elaborate transportation systems; and of investing millions of dollars in other activities and services that cannot yield adequate returns except as and if these facilities are required in the future.

It would be well to reappraise the cost and value of this forehandedness. If it is determined that the industry has not gone too far in this direction, then steps should be taken immediately to see that the cost of this gigantic burden be distributed more equitably.

This leads to the problem of prices. It is difficult to believe that an industry whose leadership has been so excellent in many respects will tolerate a situation whereby many of the modern buildings, bridges and other monumental structures of this period owe their very existence to steel that was sold for less than cost.

The American steel industry is making a wonderful record in the face of adversity. It has much to its credit. Its management is manifesting qualities of enterprise and initiative of great promise. But until steel learns how to demand adequate compensation for its service, its greatest problem will remain unsolved.

THE BUSINESS TREND

Disillusionment Strengthens Industry for 1932

STEELWORKS operating at 25 per cent of capacity! Only 67 blast furnaces active! Wholesale commodity prices at prewar levels! Leading steel producers in red ink! United States Steel Common below 40!

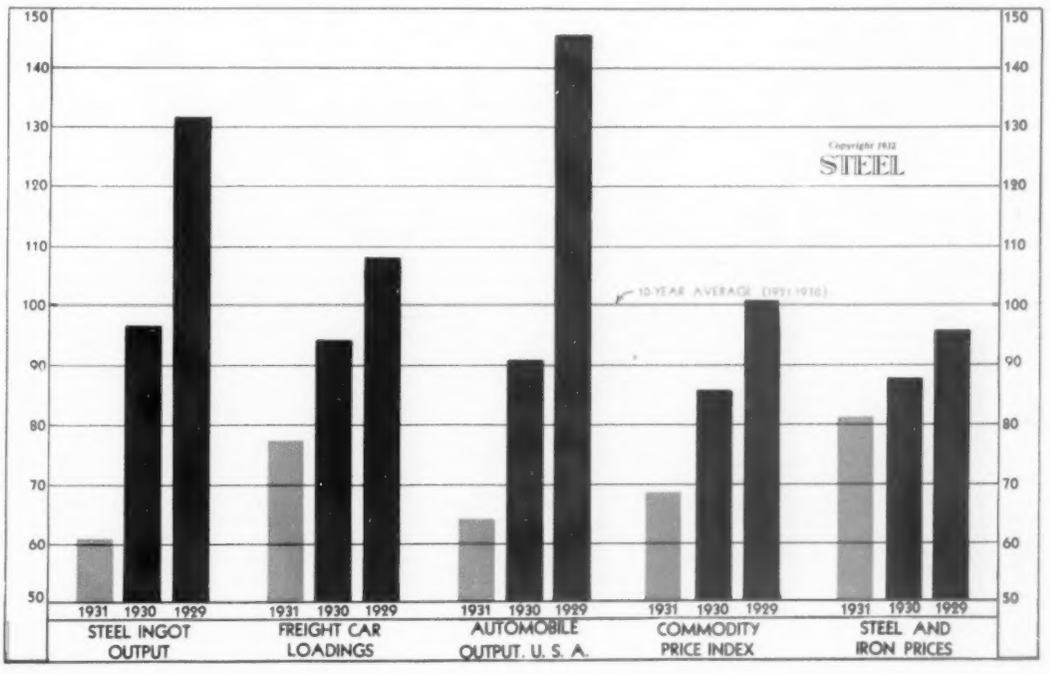
Two years ago had anyone intimated that such things would come to pass, he would have been examined for insanity. If 12 short months ago someone had been wise enough to predict these dire happenings, no one would have believed him. Yet these and many other "impossible" events are written indelibly into the record of 1931. The year will be remembered as one of the darkest in the history of American industry.

But all is not lost. Today industry is in a stronger position than it was a year ago. Last January business still was being conducted in accordance with the belief that recovery was "just around the corner." Hope of quickly returning to the easy money status of the heyday of 1929 still was rampant. This feeling of false security continued until it was dashed by the collapse of the first-quarter recovery. In spite of the warning of the third week in March, business in general did not get down to grave realities until mid-summer. The final awakening came in October when a money panic greater than the world has ever known was averted by a narrow margin.

Business, Hardened by Experience, Is Better Prepared to Face Problems of 1932

Today disillusionment is complete. This time in 1931 the business world was hoping and drifting; now it is thinking and fighting. Then the hangover from 1929 inflation was still prevalent all along the line; today the water has been squeezed out of almost everything. At the dawn of 1931 the credit situation was on the brink of a precipice but few persons were aware of the danger. That crisis is behind us.

As we enter 1932 the unsolved problems are many, but business is far better able to cope with them than it was 12 months ago.



UNITED STATES	*GREAT BRITAIN*	*GERMANY*	*FRANCE*
461 Pounds	**301 Pounds**	**286 Pounds**	**198 Pounds**

Per Capita Consumption Is Based on Latest Population and 1931 Production of Ingots and Castings Plus Imports Minus Exports

United States Lead in World Production Cut

WORLD production of iron and steel declined in 1931 for the second consecutive year, resulting in the anomaly that 17 years after the beginning of the World war production is less than when it started. Including estimation for the closing weeks of the year, steel ingots and castings made by all nations in 1931 totaled 68,662,000 gross tons, compared with 92,877,000 tons in 1930 and 117,980,000 tons in 1929, which set an alltime record.

For pig iron, world output in 1931 was approximately 55,312,000 gross tons, against 78,485,000 tons in 1930 and the record of 96,729,000 tons in 1929.

Abroad, the curtailment in 1931 was less severe than in the United States, for last year the United States accounted for only 37 per cent of all ingots and castings, whereas it made 43 per cent in 1930. And in pig iron, the proportion of the United States last year was only 33 per cent, against 40 per cent the year preceding.

In the manufacture of steel, the major nations maintained their rank—United States, Germany, France, Great Britain, Russia and Belgium, in the order named. Except that Russia made more pig iron than Great Britain, the same order also obtained in pig iron.

Contrasting 1931 with 1930, the decline in productivity in Great Britain was 27.4 per cent. Germany followed with 26.2 per cent, the Saar 17.3, Italy 16.7, France, which showed a negligible drop in 1930, fell behind 15.5 per cent last year. Russia declined only 10 per cent.

The combined output of the five original member-countries of the European steel entente-Belgium, France, Germany, Luxemburg and the Saar—was 22,950,000 gross tons, against an authorized quota of about 26,000,000 tons. Germany produced considerably less than her quota; Belgium exceeded her's.

The countries outside Europe and the United States, such as Japan and the British dominions,

World Production of Steel Ingots and Castings

Gross Tons

	1931	1930	1929	1928	1927	1926	1925	1924	1923	1913
United States	25,597,000	40,278,000	55,650,000	50,887,000	44,935,000	48,294,000	45,394,000	37,932,000	44,944,000	31,301,000
Canada	725,000	1,004,000	1,391,000	1,240,000	907,000	782,000	756,000	661,000	884,000	1,043,000
Great Britain	5,300,000	7,299,000	9,636,000	8,520,000	9,099,000	3,596,000	7,385,000	8,201,000	8,482,000	7,664,000
France	7,850,000	9,296,000	9,544,000	9,348,000	8,173,000	8,295,000	7,327,000	6,791,000	5,029,000	4,614,000
Belgium	3,110,000	3,321,000	4,066,000	3,872,000	3,645,000	3,320,000	2,508,000	2,829,000	2,260,000	2,428,000
Luxemburg	2,035,000	2,234,000	2,659,000	2,526,000	2,431,000	2,208,000	2,053,000	1,857,000	1,182,000	.....
Italy	1,455,000	1,746,000	2,109,000	1,932,000	1,570,000	1,752,000	1,757,000	1,337,000	1,124,000	919,000
Spain	700,000	860,000	985,000	770,000	653,000	598,000	616,000	531,000	456,000	238,000
Sweden	510,000	601,000	683,000	567,000	491,000	487,000	467,000	493,000	267,000	582,000
Germany	8,380,000	11,354,000	15,986,000	14,285,000	16,050,000	12,145,000	12,000,000	9,678,000	6,204,000	18,632,000
Austria	370,000	461,000	622,000	626,000	551,000	473,000	462,000	371,000	500,000	2,585,000
Czechia	1,600,000	1,795,000	2,103,000	1,704,000	1,662,000	1,316,000	1,476,000	1,200,000	984,000	.....
Poland	1,145,000	1,217,000	1,355,000	1,226,000	1,226,000	775,000	779,000	667,000	1,114,000	.....
Hungary	240,000	363,000	505,000	478,000	464,000	320,000	227,000	235,000	278,000	.....
Russia	5,000,000	5,550,000	4,828,000	4,206,000	4,150,000	3,087,000	2,087,000	1,122,000	713,000	4,181,000
Japan	1,800,000	2,203,000	2,249,000	1,840,000	1,658,000	1,475,000	1,279,000	1,106,000	973,000	300,000
India	610,000	620,000	575,000	410,000	575,000	520,000	449,000	335,000	215,000	.....
Australia	360,000	420,000	460,000	462,000	466,000	338,000	351,000	306,000	200,000	.....
Saar	1,575,000	1,905,000	2,174,000	2,040,000	1,865,000	1,709,000	1,554,000	1,423,000	981,000	.....
Miscellaneous	300,000	350,000	400,000	350,000	305,000	175,000	275,000	225,000	225,000	200,000
WORLD TOTAL	68,662,000	92,877,000	117,980,000	107,477,000	100,876,000	91,898,000	89,202,000	77,300,000	77,015,000	74,687,000

German figures in 1913 are for pre-war territory. Austrian figures in 1913 include the major portion of Czechia and Hungary. Japan's figures include Manchuria and Korea.

were no less affected and saw their output of steel seriously curtailed. This illustrates the widespread effect of the present depression. It can be reasonably said of a few nations, however, that the worst appears to have been overcome, and in these cases one may look to a fresh start toward increasing production in 1932.

A comparison of exports of iron and steel, with scrap excluded, discloses the foreign trade of Great Britain off 39 per cent last year, while German and French exports increased 10 per cent and those of the Belgo-Luxemburg economic union 5 per cent. Great Britain exported 1,935,000 gross tons of iron and steel, imported 2,750,000 tons. France exported 3,650,000 tons and imported only 400,000 tons. German exports were 4,000,000 tons and imports 850,000.

On a per capita consumption basis, the United States, as in many preceding years, led in 1931 with an average of 461 pounds of steel ingots and castings for each inhabitant. Except for 1921, this was the lowest consumption figure since 1908. Great Britain again was second with 301 pounds per person compared with 356 in 1930, greatly cutting down the lead of the United States. France was third in 1931 with 286 pounds, forcing Germany back to fourth place with an average of 198 pounds of steel for every inhabitant of the Reich.

Per Capita Production in United States

	Population in thousands	Output Steel Ingots, Castings, gross tons, thousands	Output per capita, pounds	Pig Iron output in gross tons, thousands	Output per capita, pounds
1931	124,070	25,597	462	18,383	331
1930	122,775	40,278	734	31,441	573
1929	121,500	56,433	1,040	42,614	786
1928	120,013	51,544	962	38,155	712
1927	118,628	44,935	848	36,511	691
1926	117,136	48,294	924	39,372	752
1925	115,378	45,394	881	36,700	713
1924	113,727	37,932	746	31,406	618
1923	111,693	44,943	911	40,361	806
1922	109,893	35,603	726	27,219	554
1921	108,445	19,783	409	16,688	344
1920	106,422	42,132	887	36,926	777
1919	105,003	34,671	739	31,015	661
1918	103,587	44,462	961	39,054	843
1917	102,172	45,060	987	38,621	846
1916	100,757	42,773	950	39,434	876
1915	99,342	32,151	724	29,916	677
1914	97,927	23,513	509	23,332	533
1913	96,512	31,300	725	30,966	717
1912	95,097	31,251	736	29,726	700
1911	93,682	23,676	565	23,649	564
1910	92,174	26,094	634	27,303	663
1900	75,995	10,188	300	13,789	406
1890	62,948	4,277	152	9,202	327
1880	50,156	1,247	55	3,835	171

Exports and Imports of Principal Countries

Gross tons — Scrap eliminated

Country	EXPORTS 1931	1930	1929	1928	1913	IMPORTS 1931	1930	1929	1928	1913
United States	725,000	1,635,000	2,480,000	2,373,000	2,648,000	425,000	511,000	649,000	711,000	273,000
Great Britain	1,935,000	3,158,000	4,380,000	4,260,000	4,969,000	2,750,000	2,908,000	2,822,000	2,897,000	2,331,000
Germany	4,000,000	4,465,000	5,485,000	4,643,000	*6,200,000	850,000	1,122,000	1,435,000	2,010,000	*300,000
France‡	3,650,000	4,064,000	4,270,000	5,005,000	640,000	g400,000	g510,000	281,000	151,000	185,000
Belgium & Luxemburg	3,650,000	3,862,000	4,535,000	4,492,000	†1,550,000	490,000	673,000	986,000	882,000	†874,000
	13,960,000	17,184,000	21,150,000	20,773,000	16,007,000	4,915,000	5,724,000	6,173,000	6,651,000	3,863,000

*Includes the Saar and Luxemburg; †Belgium only; ‡Includes the Saar, except for 1913; gFrom 1930, the French import statistics include materials in temporary admission, which are re-exported after fabrication.

World Production of Pig Iron

Gross Tons

	1931	1930	1929	1928	1927	1926	1925	1924	1923	1913
United States	18,383,000	31,441,000	42,270,000	37,832,000	36,289,000	39,101,000	36,370,000	31,077,000	40,026,000	30,653,000
Canada	520,000	812,000	1,160,000	1,083,000	760,000	795,000	596,000	619,000	909,000	1,015,000
Great Britain	3,750,000	6,197,000	7,589,000	6,611,000	7,294,000	2,458,000	6,262,000	7,307,000	7,440,000	10,260,000
France	8,230,000	9,874,000	10,198,000	9,821,000	9,125,000	9,281,000	8,358,000	7,570,000	5,346,000	5,126,000
Belgium	3,215,000	3,340,000	4,030,000	3,843,000	3,692,000	3,345,000	2,501,000	2,798,000	2,114,000	2,445,000
Luxemburg	2,050,000	2,434,000	2,860,000	2,726,000	2,688,000	2,472,000	2,325,000	2,123,000	1,384,000	.....
Italy	535,000	569,000	718,000	545,000	487,000	505,000	474,000	299,000	232,000	420,000
Spain	500,000	600,000	740,000	552,000	603,000	479,000	520,000	489,000	394,000	418,000
Sweden	430,000	485,000	516,000	431,000	448,000	493,000	455,000	526,000	297,000	730,000
Germany	6,050,000	9,540,000	13,187,000	11,615,000	12,893,000	9,490,000	10,014,000	7,687,000	4,857,000	19,000,000
Austria	150,000	282,000	455,000	451,000	428,000	328,000	374,000	263,000	337,000	2,344,000
Czechia	1,200,000	1,414,000	1,618,000	1,544,000	1,241,000	1,071,000	1,147,000	967,000	804,000	.....
Poland	370,000	470,000	693,000	673,000	607,000	322,000	310,000	331,000	512,000	.....
Hungary	175,000	253,000	362,000	281,000	294,000	185,000	92,000	114,000	123,000	.....
Russia	4,700,000	4,933,000	4,253,000	3,322,000	3,290,000	2,395,000	1,521,000	746,000	379,000	4,563,000
Japan	1,400,000	1,628,000	1,491,000	1,520,000	1,263,000	1,160,000	917,000	820,000	796,000	236,000
India	1,150,000	1,180,000	1,348,000	1,055,000	1,145,000	902,000	888,000	877,000	614,000	204,000
Australia	380,000	450,000	420,000	410,000	550,000	442,000	439,000	416,000	330,000	47,000
Saar	1,525,000	1,883,000	2,071,000	1,905,000	1,743,000	1,599,000	1,427,000	1,367,000	1,005,000	.....
Miscellaneous	600,000	700,000	750,000	850,000	750,000	750,000	680,000	450,000	285,000	339,000
WORLD TOTAL	55,312,000	78,485,000	96,729,000	87,070,000	85,590,000	77,573,000	75,670,000	66,801,000	68,184,000	77,714,000

German figures in 1913 are for pre-war territory. Austrian figures in 1913 include the major portion of Czechia and Hungary. Japan's figures include Manchuria and Korea.

The Statistical Record of 1931 in Tabloid

	1 Bit. Coal Monthly Output 1,000,000 Net Tons	2 Coke Monthly Output 1000 Net Tons	3 Pig Iron Monthly Output 1000 G. Tons	4 Steel Ingots Monthly Output 1000 G. Tons	5 Ind. Prod. Index No.	6 Steel Castings Monthly Output 1000 Net Tons	7 Mall. Castings Monthly Output 1000 Net Tons	8 Steel Sheets Monthly Output 1000 Net Tons	9 F. Struc. Steel Monthly Orders 1000 Net Tons	10 F. Plate Work Monthly Orders 1000 Net Tons	11 R.R. Cars Monthly Awards Units	12 R.R. Loco's Monthly Shipments Units
Jan.	38.54	3,255	1,715.4	2,458.7	82	46.29	31.27	167.9	162.4	27.52	100	16
Feb.	31.41	3,061	1,711.2	2,502.4	85	49.55	33.59	192.2	158.4	24.44	50	15
Mar.	33.87	3,406	2,028.9	2,993.6	88	56.75	35.21	224.3	184.4	31.06	2,166	10
April	28.48	3,255	2,009.6	2,722.5	90	48.28	36.08	213.6	292.8	29.92	2,798	15
May	28.31	3,219	1,995.0	2,505.5	89	43.15	31.45	201.8	152.8	26.21	20	26
June	29.19	2,802	1,637.9	2,075.9	84	35.02	23.84	147.8	177.2	22.81	1,910	19
July	29.79	2,645	1,462.3	1,886.2	83	31.75	19.94	174.9	159.2	27.26	367	13
Aug.	30.53	2,512	1,279.2	1,719.5	80	30.19	18.53	123.8	124.4	24.28	1,104	16
Sept.	31.92	2,388	1,168.4	1,547.6	76	26.95	18.19	116.8	196.8	33.47	503	4
Oct.	35.74	2,494	1,172.8	1,592.4	74	24.08	20.12	122.7	110.0	20.67	780	9
Nov.	30.02		1,101.8	1,593.7							35	7
Dec.												
Ave. 1931	31.62	2,904	1,571.1	2,145.2	83	39.20	26.82	168.6	171.8	26.76	894	13
Ave. same period, 1930	38.38	4,172	2,706.9	3,391.5	99	90.13	45.74	235.0	238.6	40.95	3,856	65
Ave. 12 mos. 1930	38.47	4,026	2,620.1	3,273.9	96	82.66	42.92	212.0	224.1	39.12	3,762	64
Monthly Ave. for 10 Years	41.56	4,029	2,814.6	3,433.5	99	78.54	59.28*	278.1†	242.1	40.16‡	7,094	99

*Monthly average of last six years. †Monthly average of last seven years. ‡Monthly average of last five years.

	13 Steel Barrels Monthly Output 1000 Units	14 Steel Furniture Monthly Orders $1,000,000	15 Galv. Pails and Tubs Monthly Output 1000 Dozens	16 Enam'l'd Ware Monthly Shipments 1000 Dozens	17 Autos U. S. A. Monthly Output 1000 Units	18 Building Construction Monthly Awards Million Sq. Ft.	19 Machine Tools Monthly Orders Index No.	20 Foundry Equipm't Monthly Orders Index No.	21 El. Trucks, Tractors Monthly Shipments Units	22 Boilers Monthly Orders Units	23 Stokers Monthly Sales Units	24 Unfilled Orders U. S. Steel Corp. 1000 Tons
Jan.	421.8	2.26	103.7	267.2	171.9	24.63	66.9	65.3	38	598	85	4,132.3
Feb.	450.1	1.88	132.8	289.2	219.9	28.34	83.7	54.7	56	516	66	3,965.2
Mar.	550.6	1.94	146.4	312.9	276.3	38.02	117.6	174.4	93	630	63	3,995.3
Apr.	591.4	1.83	143.3	281.3	336.9	39.38	105.1	57.7	71	689	65	3,897.7
May	610.8	1.81	121.4	264.9	317.2	38.94	87.2	54.1	69	658	80	3,620.5
June	552.9	1.72	92.5	232.7	250.7	33.75	73.6	40.9	75	818	111	3,479.3
July	580.6	1.42	103.3	246.9	218.9	33.81	61.5	38.7	78	816	101	3,404.8
Aug.	449.6	1.32	136.0	251.5	187.2	30.63	71.7	16.9	50	827	132	3,169.5
Sept.	451.6	1.36	110.2	307.1	140.6	30.07	56.0	31.9	43	893	96	3,144.8
Oct.	489.6	1.42	98.3	255.8	80.1	30.70	44.5	45.9	17	672	83	3,119.4
Nov.						20.52	50.8	17.2				2,933.4
Dec.												
Average, 1931	514.9	1.70	118.7	270.9	219.9	31.71	74.4	54.2	59	711	88	3,532.0
Ave. same period, 1930	652.6	2.83	116.2	301.2	306.3	42.52	133.3	109.0	113	1157	105	4,005.1
Ave. 12 mos. 1930	619.6	2.69	109.1	293.9	279.7	41.34	127.8	105.0	102	1097	98	4,000.0
Monthly Ave. for 10 Years	643.8*	3.44*	130.5†	336.2**	307.9	63.24	144.0	145.5	123‡	1426*	116°	4,462.0

*Monthly average last 3 years. **Monthly average last 4 years. †Monthly average last 5 years. ‡Monthly average last 6 years. °Monthly average last 8 years.

	25 Iron and Steel Foreign Trade Exports 1000 Tons	26 Iron and Steel Foreign Trade Imports 1000 Tons	27 U. S. Foreign Trade Merchandise Exports Million Dollars	28 U. S. Foreign Trade Merchandise Imports Million Dollars	29 Comm. Failures Dun's Number	30 Car Loadings Weekly Ave. 1000 Cars	31 Ohio River Traffic Monthly at Pgh. 1000 Tons	32 Wholesale Prices Bradstreet's Index Dollars	33 Steel, Iron Prices Steel's Composite Dollars	34 R. R. Earnings Net Million Dollars	35 U. S. Steel Earnings Gross $1000
Jan.	92.7	40.8	249.6	183.1	3,316	719	88.0	9.51	31.71	33.8	6,118
Feb.	91.2	28.0	224.8	174.9	2,563	709	75.0	9.31	31.65	27.3	6,156
Mar.	109.5	40.4	235.9	210.2	2,604	735	104.8	9.17	31.66	45.9	7,191
Apr.	101.0	47.9	215.1	185.7	2,386	752	91.6	9.23	31.59	39.1	5,135
May	91.4	37.2	204.0	179.7	2,248	740	59.6	8.91	31.37	41.2	4,183
June	75.6	37.8	187.1	173.5	1,993	748	46.9	8.64	31.02	50.1	4,499
July	84.5	37.2	180.7	174.5	1,983	738	39.3	8.78	31.05	56.5	3,662
Aug.	73.3	30.1	164.8	166.7	1,944	747	49.2	8.79	31.05	55.8	2,960
Sept.	69.8	30.9	181.0	170.4	1,936	737	49.3	8.49	31.03	55.3	2,559
Oct.	59.3	29.4	205.0	169.0	2,362	759	49.1	8.30	30.74	64.0	
Nov.			193.0	150.0	2,195	655		8.09	30.61		
Dec.								7.91	30.35		
Average, 1931	77.9	36.0	203.6	176.1	2,321	729	65.3	8.76	31.15	47.2	4,718
Ave. same period, 1930	176.8	45.4	324.4	259.3	2,166	898	109.1	10.75	33.52	77.4	14,964
Ave. 12 mos. 1930	165.1	44.8	320.3	255.1	2,196	880	105.3	10.75	33.52	73.8	13,148
Monthly Ave. for 10 Years	181.4	58.4	382.9	311.8	1,851	935	91.4*	12.62	38.30	84.5	14,481

*Monthly average last four years.

Production of Steel Ingots and Castings Shows Steel's Recuperative Power

Year	Production, Gross Tons	Gain or Loss
1902	14,947,250	.....
1903	14,534,978	—412,272
1904	13,859,887	—675,091
1905	**20,023,947**	**+6,164,060**
1906	23,398,136	.....
1907	23,362,594	—35,542
1908	14,023,247	—9,339,347
1909	**23,955,021**	**+9,931,774**
1917	45,060,607	.....
1918	44,462,432	—598,175
1919	34,671,232	—9,791,200
1920	**42,132,934**	**+7,461,702**
1921	19,783,797	—22,349,137
1922	**35,602,926**	**+15,819,129**
1923	**44,943,696**	**+9,340,770**
1929	56,433,473	.....
1930	40,699,483	—15,733,990
1931*	25,597,000	—15,102,483
1932	.....	.....

*December estimated.

Steel Fights To Loosen Grip of Depression

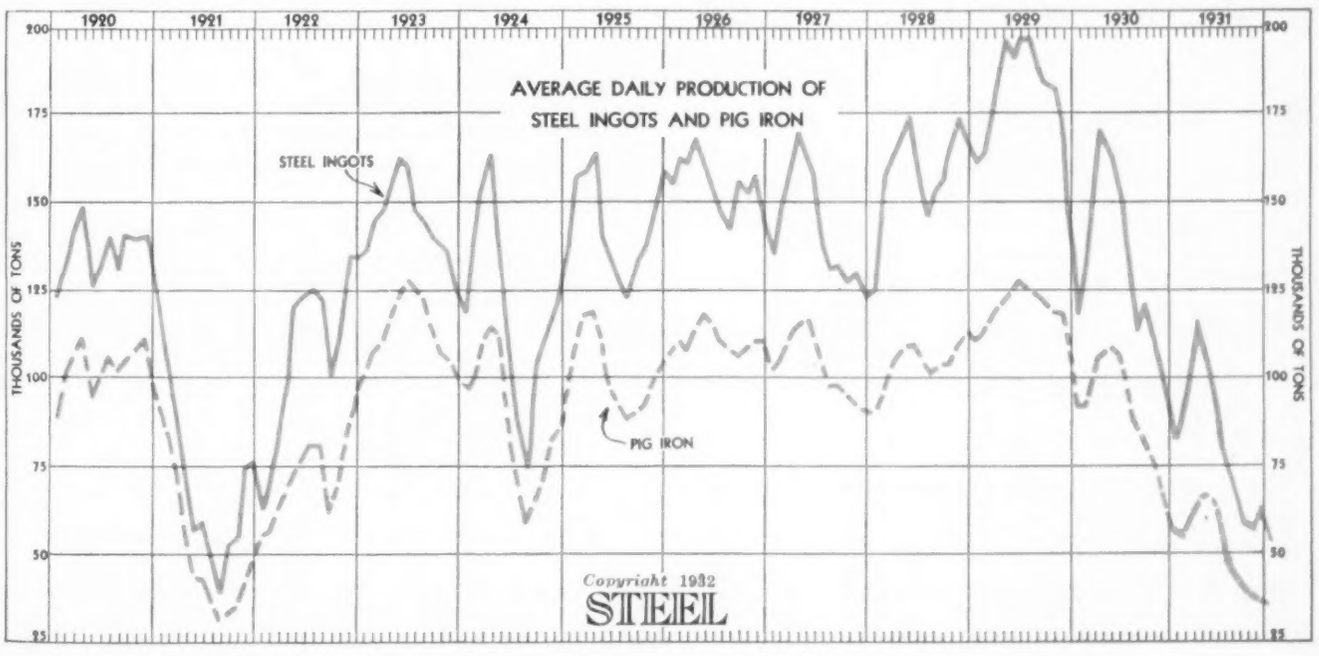
INDICATIVE of the broad sweep of the depression is the fact that in the record of 35 barometers of business presented on the opposite page, in every instance figures for 1931 are unfavorable in comparison with the average for the 1921-1930 decade. With the exception of one minor product, the averages for 1931 reflect a recession from those of 1930.

The plight of the steel industry is explained readily by the statistics of the principal consuming groups. The volume of building awards has declined in three consecutive years—the first time this has happened in a record that goes back to 1910. Automobile output has dropped for two years running—the first time since the motor car industry became a steel consumer worthy of notice. The volume of railroad freight traffic has receded for two years, a new experience for the carriers since they emerged from federal operation.

Similar indications of diminished activity in point of depth and duration are found in the records of equipment orders, sales and shipments of manufactured products of steel and volume of fabricated steelwork.

When and how the steel industry will find its way out of the present lethargy is a question that cannot be answered now. The experience of the past shows that steel always has demonstrated remarkable recuperative powers in coming out of a slump. The brief tabulation at the top of this page indicates how sharply the annual production of steel ingots and castings has risen after each serious recession in the twentieth century. If history repeats itself the outlook for a strong comeback in the next few years is encouraging.

Wholesale commodity prices, as reflected by Bradstreet's index has been dropping almost continuously since 1928. In the two years end-



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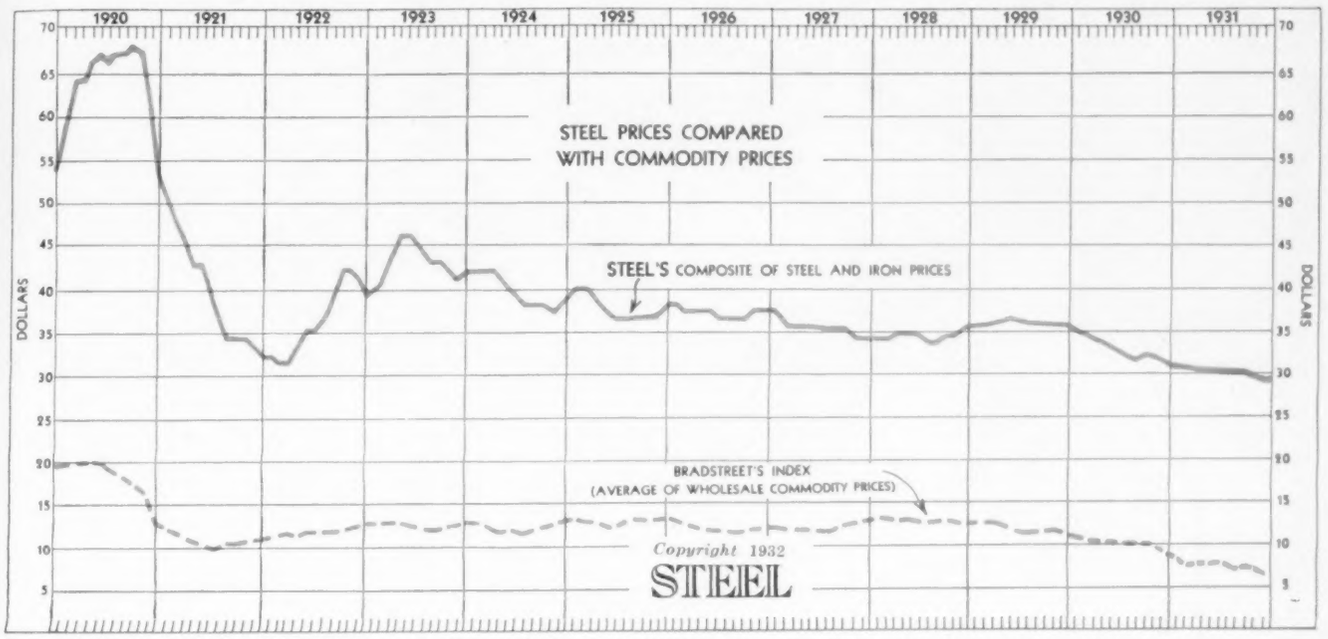
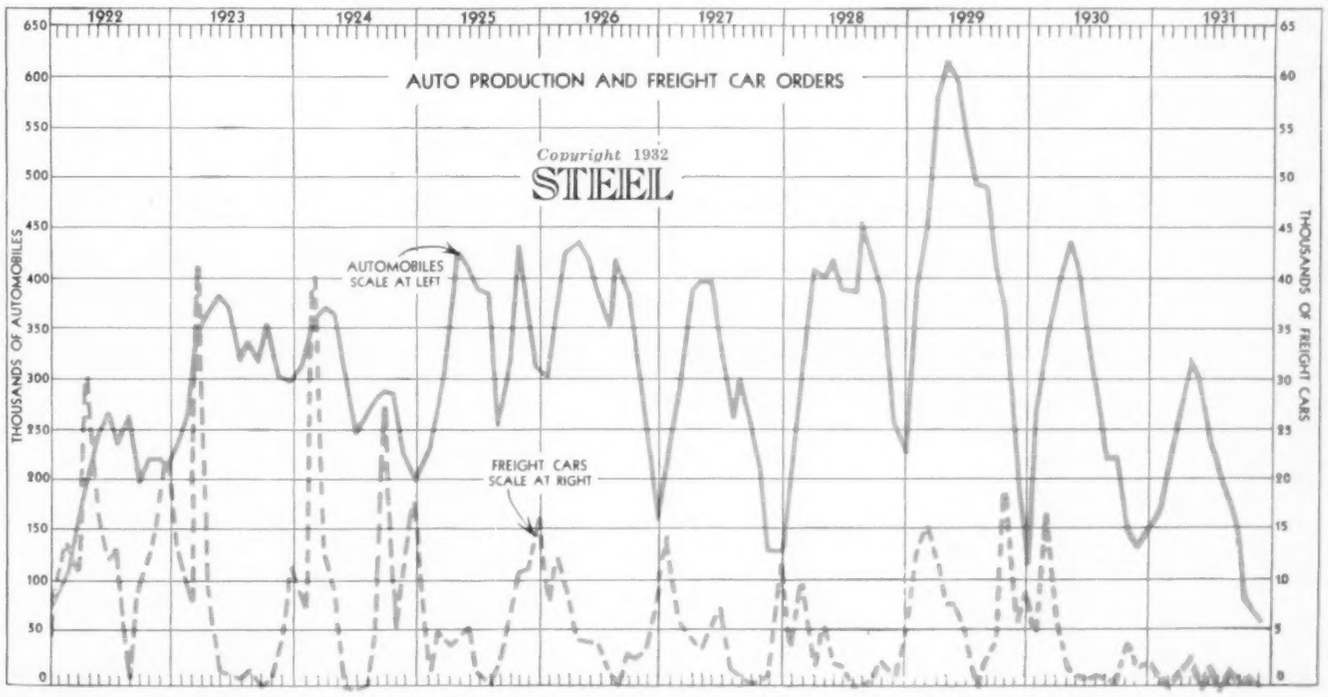


ing Dec. 1, 1931, the index number declined from $12.23 to $7.91, a drop of $4.32 of which $2.39 was recorded in 1930 and $1.93 in 1931.

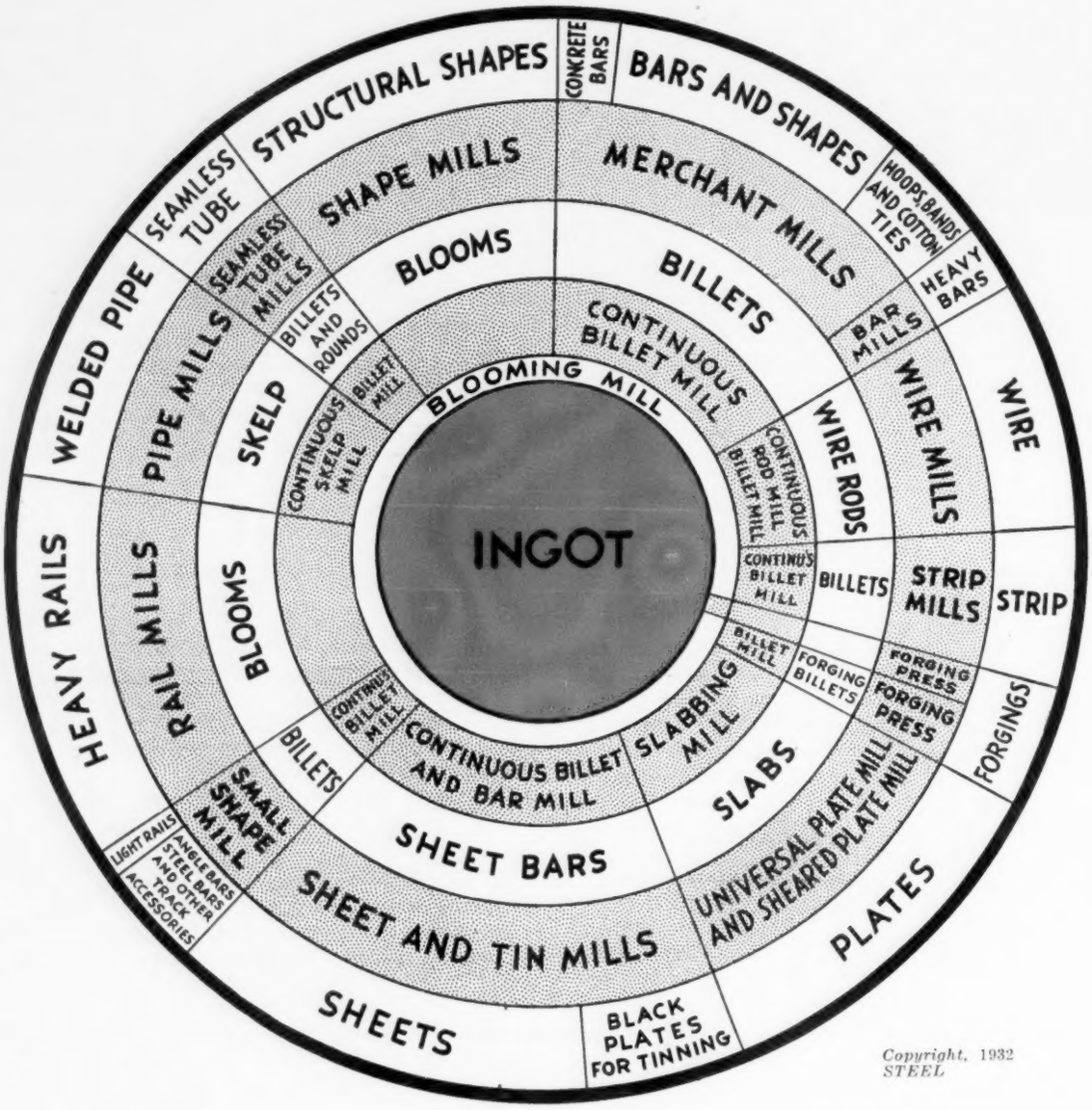
Compared with the trend of Bradstreet's, iron and steel prices swept down more precipitously in 1930 but less sharply in 1931. Steel's composite suffered a drop in the two years from $35.88 to $30.28 (approximately), a loss of about $5.60 of which $4.22 occurred in 1930 and $1.38 in 1931. The favorable deceleration in 1931 would be more impressive if it were not for the present unsettled price situation.

Caught between the millstones of meager volume of business and prices which go back to prewar years, industry has been hard put to make a profit. Commercial failures, as compiled by Dun's, mounted to new heights during the past year. Steel companies reduced or omitted dividends.

Reductions in wages, striking economies in operations and other steps taken in 1931 by management to put the house of steel in order will be fully effective in the coming year. However reasonable volume and firm prices must reappear before the industry can be accorded even a fighting chance of earning a fair profit.



DISTRIBUTION OF THE STEEL INGOT



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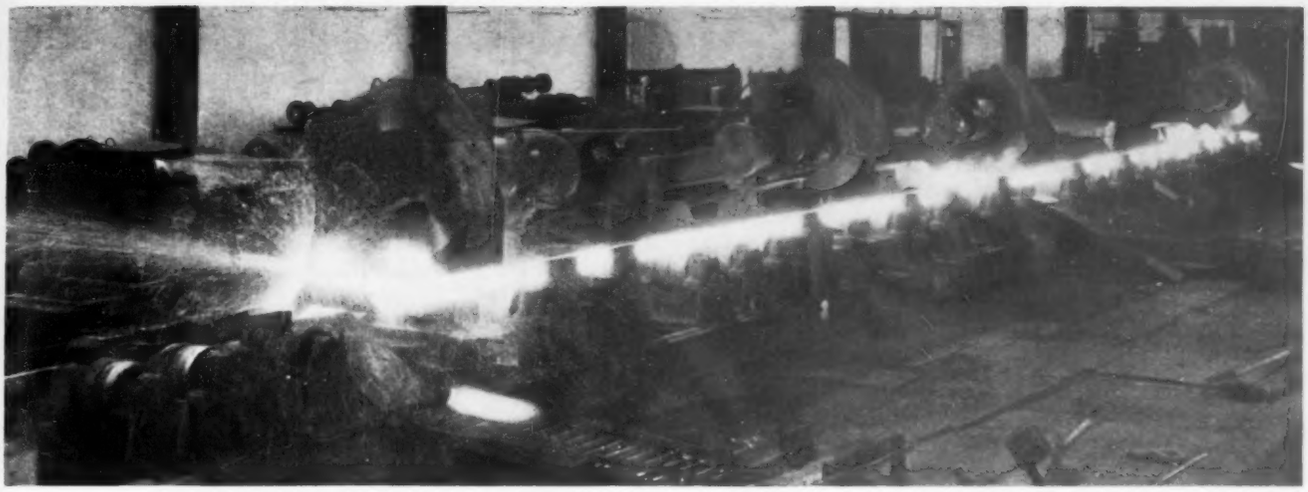
This chart shows the processes and products involved in the conversion of steel ingots into finished steel. The sectors are drawn to indicate the approximate distribution of ingot tonnage into semifinished and finished products, based on averages of the past few years.

Copies of the above chart printed on linen-backed paper may be obtained by addressing STEEL, Penton building, 1213 West Third st., Cleveland, O. at 10 cents each to cover the cost of postage and mailing



Engineering Efforts of 1931 Directed Toward Economy in Operations

BY E. F. ROSS
Associate Editor, STEEL

IN THE early stages of depression industry sweats out extravagances of prosperity, sets its house in order and expands research to improve product. This was the program in 1930. In 1931, however, shrinking business obliged organizations to fight to maintain existence—drastic economy was compulsory. Sharp competition and attendant unprofitable prices required the reduction of production costs and seeking of economical operations.

Management was forced to revise programs often in 1931 as demand for steel products dwindled. Continuously lowering operating rates created new problems relating to both labor and equipment and executives were hard put to arrange schedules which would be economical. Efficiency of labor improved, but efficiency of equipment decreased in many cases because of less than full-load operation, short turns and frequent starting up and closing down. How well industry solved these problems is indicated by the fact that it will re-enter the profit area when operations move upward to between 40 and 45 per cent; it passed out of the profit area at 50 per cent. Therefore, the industry is closer to profitable business at the beginning of 1932 than it was at the start of 1931. With paring down in personnel, research underwent curtailment; but, generally speaking, development of new markets was pushed vigorously.

As was to have been anticipated, therefore, the year just closed witnessed the introduction of many new products and processes and much new equipment. In periods when need for economy is so pressing, research engineers and designers have much to spur them in developing improved processes and equipment; but their efforts must be comparatively remarkable to gain recognition. To their credit, some truly remarkable accomplishments in 1931 can be recorded. Blast furnace operators found that stacks could be removed from production over weekends or for short periods and restarted quickly without affecting pig iron quality. Previously such operation was regarded as impossible. Steelmakers devised ways to make steel of highest quality at lower cost and learned that open-hearth performance can be improved by mechanical control. Rolling equipment was modernized, larger strip mills were built and mill drives and control apparatus underwent considerable development.

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ON the succeeding pages STEEL presents its fifth annual composite review of engineering progress in the steel and associated industries. To the more than 90 leading engineers, metallurgists and operating officials in the country whose generously contributed opinions have made possible this resume of technical developments in 1931, STEEL gratefully expresses appreciation and acknowledges indebtedness.

—The Editors

Simplify Weekly Shutdowns By Slow Driving of Stacks

SLACK operating conditions have wrought what was considered a few months ago by the blast furnace industry as the impossible. Had a blast furnace superintendent been so bold as to suggest operating a stack for a few days with the blowing engines just turning over and then apply normal blast without a blank of coke being in front of the tuyeres, his idea would have been stamped as ridiculous. Yet the blast furnace industry witnessed successful practice on this basis in 1931.

To get the prospectus of advancement in American blast furnace design, equipment and practice in 1931, points out R. H. Sweetser, consultant in blast furnace practice, New York, attention must be directed to various countries in which American engineers and managers are building plants for large tonnage per furnace, large blast volumes and high blast temperatures. In nearly every case aim is to use the richest iron ores, but usually coke quality is not of the highest standard.

In our own country where there has been a surplus of blast furnaces, pig iron, iron ore, labor, coal and coke, part of the progress has been the slowing down of stacks. Consensus of opinion is that slow blowing is satisfactory when there is no requirement for iron and that banking stacks over weekends when hot metal is not needed is economical practice. One large plant banked its blast furnaces on an average of 2½ days over weekends for several weeks in succession and experienced no difficulty in resuming operations.

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THE two major problems in blast furnace practice, especially for interior stacks, are richer ore mixtures and uniformily cleaned coking coal mixtures. Increased freight rates intensify these problems. Beneficiation of iron ores is progressing steadily and use of rich magnetic fines has been made possible by the sintering process. Fine grinding and improved magnetic concentration have made available iron ores containing as high as 68 to 70 per cent iron in the natural state. Washing of coking coals, concludes Mr. Sweetser, now is recognized as of prime importance in reducing cost of steel ingots and improving quality of iron and steel products, especially in the Pittsburgh region.

Most blast furnace plant operators and managers, states F. H. Willcox, vice president, Freyn Engineering Co., Chicago, have had part in the extraordinary expansion of the last 20 years in the use of minerals in America, which in the steel field culminated in the production of as much pig iron in six years ending 1930 as in the 60 years ending 1900.

The year just closed provided a break in the tempo which, if it had been carried on at the accelerated rate of the last decade and a half, would have led to fantastic figures of production, to an unbalance in capital expenditure, to strains on mineral resources and probably on management—all impossible of realization.

Coke an Important Factor

During 1931 slow driving has been brought to a high degree of proficiency with furnaces of 30,000 feet cubical content and under, but with furnaces beyond this capacity, it has not been so successful. Intermittent blowing has worked out well on furnaces over 30,000 feet cubical capacity. A superior coke, especially a physically superior low-ash coke,

Eugene Hutchinson, Chicago

has proved a considerable factor in economic slow driving.

Slack operation has prevented any developments in the further use of mixed gas, Mr. Willcox states, but it is to be expected that with pickup and stabilization of operation, this sound policy will progress as opportunity is afforded to change over at ovens, open hearths and heating furnaces, except in districts where increasing use of natural gas tends to throw more coke oven gas into the plants. This temporary lag in gas utilization in other departments, however, has not lessened the interest in more economic use of gas at stoves. This has been part of the outstanding work of department superintendents in rational reduction of production costs. Logically accompanying such work is increased study and fixing of facts, instead of acceptance of premature or undeveloped trends.

There is an appreciation of and interest in conservation of materials, whether raw materials or materials tied up in equipment. Enforced slower driving, a resultant higher relative sinter plant capacity, slower coking and use of cheaper coals, lower losses and lower fuel ratios, and use of cheaper ores, have caused a definite shifting of viewpoint from the higher tonnage ideas of the first post-war decade.

Continuing, Mr. Willcox states there is a sounder view as to the increasing necessity of continuous operation in the light of huge sums tied up in plant units. In other words, necessity of so improving existing equipment has arisen that less and less time is required for stops or for repairs to top, changing goggle or hot blast valves, or cleaning and replacing stove linings. There is an increasing realization of the worth of skill, experience and watchfulness in conjunction with planning by superintendents, whereby a minimum number of changes in burden, charging, wind, and heat are resorted to. Precise and regular work, from charging to casting, has assumed a significance and worth with slower driving, which it did not have with fast driving. This has reacted against an incipient tendency to cut stockhouse and casthouse men to an extreme, and in favor of adequate tools and controls.

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THE trend of this year, therefore, seemingly confirms an increasing use of fine gas cleaning, efficient stoves, control equipment, perfected mechanical auxiliaries, and points—as to the furnace itself—to increased study of top design, inclusive of stockline protection and clearance, and attainment of lower metallic loss and increased regularity of operation.

Concluding, Mr. Willcox voices the opinion that the blast furnace profession has every reason for confidence in its management and engineering ability, as developed during the last two years, to individually

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Steelmakers Strive for Low-Cost, High-Quality Ingots

INTEREST in open-hearth furnace economies was stimulated during the year just closed probably to a greater extent than that shown in any other steel mill department. As pointed out by A. J. Ebner, mechanical engineer, Freyn Engineering Co., Chicago, the pressure against rising cost at low production rates finds the open-hearth shop a convenient point for concentration, since recent developments have disclosed opportunities for much needed improvement.

Of outstanding interest to open-hearth men has been the subject of machine control for furnaces. While opinion differs as to types and extent, states Mr. Ebner, the interesting fact has been brought out that whatever the type or how much or little control equipment is used, the furnace generally will show improvement. The point is made by many operators that concurrently with application of control mechanism, the furnace is so completely gone over for air and gas leaks, insulation, door and valve gear, adjustments, etc., that credit for better performance lies mainly in a tighter furnace and carefully observed operations. But while this is true, experience with furnaces in good structural condition indicates necessity for at least a reliable fuel-air ratio and draft control.

The past year has witnessed a noteworthy increase of waste heat boiler installations, the Chicago district alone having equipped over 25 furnaces with boilers of the fire-tube type. Two furnaces in a Canadian plant also have shown good returns from boilers of this type. Steam production figures are reported over 1450 pounds steam per ton of steel, or a recovery of about 23 per cent of the heat input to the furnace. Both furnaces are fired with mixed blast furnace and coke oven gas, one of them operating under automatic combustion control.

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CONCERN is shown, particularly in the midwest, in regard to advent of natural gas for industrial fuel. In plants where fuel oil is used, its present low cost is not conducive to a change over to natural gas in open-hearth practice, although thought is being given to preparation for such a move in the future, states Mr. Ebner.

In the case of large fully integrated steel mills, development of programs for extensive use of mixed blast furnace and coke oven gas will need revision, depending upon the magnitude of natural gas sales to domestic consumers. A greater surplus of coke oven gas at mills undoubtedly will result in larger use of this gas at the open-hearth plant. Straight coke oven gas is an excellent fuel when used in a properly designed open-hearth furnace. It has the advantages over mixed gas in lower cost of distribution and less overall cleaning expense of the total blast furnace gas production.

Debate Value of Large Units

Unanimity of opinion is lacking, according to Mr. Ebner, as to the economic worth and advantage of the 250-ton plus furnace over the 150-ton plus furnace shop. Had the trend toward super large stationary furnaces started earlier, probably 1929-1931 would have seen more of them built, though perhaps not working. Circumstances of 1930-31 and the thought and improvement consequent thereto, concludes Mr. Ebner, most likely may slow up any incipient rush into the big stationary furnace.

Operating managements of steel

plants during last year concentrated on making the lowest cost ingots possible with the mixture of scrap available, comments L. F. Reinartz, works manager, American Rolling Mill Co., Middletown, O. Comparatively little new development work has been done, he points out, along the line of combustion control, except that in the newer furnaces an effort has been made to insulate the furnaces as thoroughly as possible, making the hearth of sufficient length to get the full benefit from the flame without any serious difficulties being encountered on account of burning down the ends of the furnace.

Exceptional results from a cost and fuel consumption standpoint, he further points out, have been obtained from a 100-ton open-hearth furnace in a plant in the Middle West, which has been equipped with combustion control apparatus for several years.

The steel plant executive's job at present, in the writer's opinion, is to attempt to balance operating schedules between mills and open hearth so that the former receive as much hot steel as possible, and at the same time, costs are not unduly increased in the latter because of lengthy week-end shutdowns. The tendency in the immediate future in open-hearth operation, concludes Mr. Reinartz, will be to make use of known methods to improve quality and decrease costs rather than to install expensive auxiliary equipment for control purposes.

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ONLY a few years ago combustion controls of any kind were considered a luxury; today they become to be considered as vital tools in the hands of the open-hearth operator, comments H. Dobrin, consulting fuel engineer, Pittsburgh. In these various controls have been embodied the means for properly proportioning the necessary volumes of air to gas, and for setting up definite furnace atmospheres and fuel mixtures. Stack damper controls and controls for reversing by means of differentials in checker temperatures now are considered standard equipment. Such auxiliary equipment as mechanically induced draft and double-pass checkers also is being installed at plants here and there.

In no part of the steel industry had the rule of thumb prevailed as much as it had in the operation of the open hearth, and as soon as the rule of science began, remarkable things followed in its wake. In one particular case the stack damper regulating control had been set for a back pressure of 0.06-inch. When this pressure was permitted to go to only 0.04-inch, the furnace performance started to decline and a few hundred degrees of temperature was lost in a few minutes. When the former pressure was restored the furnace picked up immediately.

A slight excess of air or a shortage thereof, a few hundredths of an inch plus or minus of pressure, a few additional leaks in the checkers, infiltration of unnecessary air, a dif-

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Rolling Industry Attends to Precision in Mill Control

NUMEROUS steel manufacturers have taken advantage of one of the leanest production periods the industry has experienced in many years by modernizing some of their rolling mill equipment. Among the most interesting drives built this year, states H. A. Winne, industrial engineering department, General Electric Co., Schenectady, N. Y., is that for a push bench mill in the Pittsburgh district to produce seamless steel tubes. Control is arranged so that upon direction from the operator, the motor will start and accelerate the ram, force it through a series of dies, at a predetermined speed, stop, reverse, and return to the initial position at a high rate of speed.

What is believed to be the widest cold strip mill so far built is a 72-inch tandem 2-stand cold strip mill being installed in the Cleveland district in conjunction with a 72-inch wide continuous hot strip mill. Each stand of the cold mill will be driven by a 1500-horsepower motor, the largest ever used in cold strip mill drives. Control equipment for this mill is so arranged that the reel motor at all times automatically maintains the strip under tension, regardless of whether the mill is at a standstill or is running.

A 76-inch continuous hot strip mill, capable of rolling wider strip than any other similar mill so far installed, is being placed in operation at Indiana Harbor, Ind. The first stand of this mill is driven by a 1000-horsepower squirrel-cage induction motor which is started at reduced voltage obtained by connecting a reactor in the neutral of the motor windings.

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A 3-HIGH universal plate mill, driven by a 4000-horsepower adjustable-speed motor has been installed in Alabama. The motor control permits entering the slab in the mill at comparatively slow speed and then accelerating and finishing the pass at a higher speed, thus increasing production.

Special small induction motors and control equipments have been developed for use on automatic catchers for sheet and tin mills. These motors are required to reverse a maximum of 40 times a minute which is extremely rapid service for a squirrel-cage induction motor.

Installation of an electric regenerative drag on a sheet mill has been made at a plant in the Detroit district. The drag, which was described in the Oct. 12 issue of STEEL, not only permits accurately adjusting and maintaining the desired drag torque, but also effects considerable power savings as the generator output is returned to the power system.

Motors for Runout Table

An interesting installation of a large number of small induction motors now is being made in a midwestern steel mill. Each motor will drive through suitable gearing two rolls forming part of a runout table on a large hot strip mill and will start and stop twice a minute. Control is such that the operator merely throws a master switch from the running position to the off position, or vice versa, and the automatic control insures the proper sequence of operations.

Practically all modern cold strip mills employ winding reels which are designed to put considerable tension in the strip between the last stand of the mill and the reel. A system of control employing standard devices has been developed which insures uniform acceleration and deceleration of the reel and the last stand motor under all conditions.

During the past year an automatic

screwdown control equipment has been developed for use on reversing blooming mills, plate mills and the like, which permits the roller to set up a complete schedule of passes on a master control board.

A new type of speed regulator has been developed for direct-current motors in steel mill service which provides a greater sensitivity and range in adjustment than previous types. An improved type of steel control desk for the pulpit of modern continuous mills also has been developed, each section containing necessary control switches for starting, stopping, and adjusting the speed of two main roll motors. Another new development is the keyboard type of master switch for controlling steel mill auxiliaries which permits spacing units on approximately 2½-inch centers so that a large number of controls can be concentrated within reach of the operator.

One of the outstanding developments of 1931, cited by R. J. Wean, president, Wean Engineering Co. Inc., Warren, O., was successful modernization of the conventional sheet and tin mill. To deliver stock flatwise from the automatic catcher to the feeder, tables were developed with the tilt point at the extreme end. In addition, changes were made in the method of driving to obviate operating interference with other auxiliary equipment. The changes have afforded outputs of 34 tons of 27-gage sheets per mill with two heatings, a runover, a reheating and finishing passes.

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IN COMMENTING on developments in steel plant electric drives in 1931, A. F. Kenyon, steel mill engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., states that several months operation of two 10,000-horsepower twin-motor reversing equipments on a 54-inch blooming mill and the main horizontal rolls of a 44-inch universal slabbing mill, respectively, has justified claims made when this method of drive was proposed. Absence of mill pinions has greatly reduced backlash and chattering of the rolls.

Control equipment for the 44-inch universal slabbing mill permits adjustment of the normal 1:1 ratio of the speeds of the upper and lower roll motors, so that rolls of slightly different diameters may be used. The control also permits adjustment of ratio of speeds of the horizontal roll drive and the vertical edging roll motor to compensate for variations in reductions, in ratio of roll diameters, etc.

Usually the vertical rolls have been driven through bevel gearing by conventionally designed horizontal motors, but recently there has been built a 10-inch continuous bar mill with the two vertical finishing stands driven by 800-horsepower vertical motors. The vertical motors are mounted on heavy structural steel supports directly above the rolls and pinions.

During the year a new line of heavy-duty magnetic controllers for steel mill service has been developed. The contactors are of a radically different design and provide fast operation. Relays are of the thermal type and have the feature of tripping instantaneously upon overloads of about 400 per cent.

Makers of Forgings Effect Economies in Production

A NEW pressure method of forging to close limits, thereby reducing weight of product; increased popularity of rotary-hearth heating furnaces; wider adaptation of manipulating mechanisms; and improvements in forging machinery to afford machine tool precision, higher speeds and automatic lubrication appear as notable developments in the forging industry in 1931.

Forge plants throughout the country have an enormous capacity, more than enough to fulfill all requirements in a good business period. The low demands placed upon the industry in 1931 have made it necessary to effect every possible economy in the manufacture of forgings, in the opinion of L. E. Ruby, works manager, Pittsburgh Forgings Co., Jackson, Mich. The struggle for available forging business made competition a powerful weapon in forcing prices for forgings to an unbelievable low level, far inconsistent with commodity prices in general and manufacturing costs.

Quality and Uniformity

Despite lowering prices, trend in forgings has been toward more uniform and higher quality, production machine tools having made this uniformity a real necessity. Mr. Ruby declares forgings now are made to as close limits as they were machined a few years ago.

Reduction in weight of forgings in 1931 was outstanding, he says, forging limits leaving little stock to be machined off, yet providing finished surfaces free from defects. Automatically controlled forging furnaces, more rigid forging equipment and closer inspection have made this possible. The rotary-hearth forging furnace is gaining popularity, although the continuous pusher-type billet heating furnace still predominates.

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A NEW method of forging has been provided, according to Mr. Ruby, with introduction of a vertical forging press which is quick acting and capable of withstanding enormous pressures. Gears, connecting rods, flanges, hubs and other forgings are produced by this method with speed and precision. This type of press has great possibilities. In drop hammers, air is replacing steam.

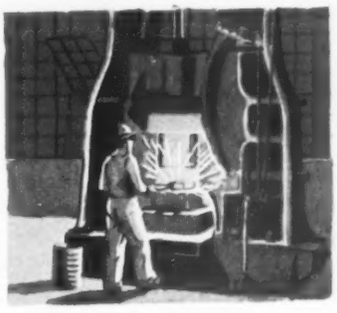
In engineering development of forgings, trend is toward a combination of parts to eliminate as many wearing surfaces as possible. One forging, even of intricate design, may replace two. Elimination of weight with maintenance of strength is constantly in the designer's mind and much has been accomplished in this direction.

As to the future, 1932 progress will not be as great as it was in 1931, believes Mr. Ruby, although no doubt a metal or treatment will be developed for producing wide thin sections. Material with greater wearing ability will be developed for forging equipment to increase service and lower maintenance costs.

E. F. Davis, metallurgist, Warner Gear Co., Muncie, Ind., also refers to the new pressure method of forging, stating that it has proved adaptable for direct forging operations and that it shows much promise for closer control of forging sizes. He further points out that efforts are being made to reduce the scaling of steel to enable closer dimensions and less finish.

According to the manufacturer of the new press, finish forming or hot coining usually is performed with the original heat remaining in the hammer or upsetter forging, before or after trimming, or the normalizing or annealing heat can be utilized. In either case, no additional heating operation is required. Since the temperature has dropped below the scaling point, the forgings are uniform and accurate and have good finish.

W. W. Criley, Ajax Mfg. Co., Euclid, O., reports trend in forging machinery is toward refinement to practically machine tool precision, both in alignment and rigidity which makes it possible to produce forgings to an accuracy and closeness of dimension limited only by the degree to which dies are maintained.



There is a pronounced trend toward centralized lubrication to minimize wear and maintain alignment, even under the severe conditions in which forging machines operate. Automatic handling or manipulating mechanisms now are used to perform operations which in the past were universally manual. More attention is being paid to temperature control in heating stock for forging and considerable development along this line will be seen in the future.

Improvements in forging presses have been notable, says E. V. Crane, staff engineer, E. W. Bliss Co., Brooklyn, N. Y. Most interesting features include hydropneumatic overload relief in the bed, devices for close control of tool pressure, hydraulic knockouts, pneumatic slide counterbalance, automatic lubrication, and V-belt motor drives.

A new type of mechanical press, states Mr. Crane, gives promise for work now handled on board drop hammers. Thought is being given to adapting for more general use rotary furnaces for heating forging blanks.

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BOARD drop hammers have been improved during the year with the design being brought up to machine tool standards, both as to functioning and accuracy of manufacture, reports Macdonald S. Reed, sales engineer, Erie Foundry Co., Erie, Pa.

Manual handling of heavy forgings is being replaced by mechanical manipulators, according to Edgar E. Brosius, president, Edgar E. Brosius Inc., Pittsburgh. An example of this advancement is a self-contained floor manipulator unrestricted in its movement and handling 1600-pound axle blanks. With use of an articulate peel with two sets of shock absorbing springs, pieces are handled with speed and accuracy and no shock is transmitted to the machine.

Engineering Effort in 1931 Toward Economy

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Outstanding in the forging industry was a new method of pressure forging which produces work to closer limits, thereby reducing the amount of finish machining. Adoption of codes governing fusion welding spurred construction of pressure vessels and boilers.

Riveted construction held its position with notable improvements in rivet manufacture. Stainless steel rivets made their appearance. In heat treating, gas carburizing gained popularity and more was learned about nitriding. Changes in machine tool design were revolutionary.

The foundry industry reduced its capacity; studied new uses for castings and new markets. With closer control of manufacturing processes, refractories showed less spalling and longer life in service. Insulation of metallurgical furnaces provided gains in heat economy. Improved materials handling equipment stimulated mechanization.

Adoption of Welding Codes Is Stamp of Acceptance

ADOPTION in 1931 of codes approving fusion welding of pressure vessels and boilers is hailed as a most important accomplishment in the welding industry. Closely related to this development was the perfection of superior electrodes and welding wire. All welding applications were extended during the year, technique was improved and much new equipment was introduced. Progress in structural welding proved notable. In spite of all welding advances, however, riveting maintained a solid position as an important method for joining metal structures.

Recognition by authoritative bodies that quantitative tests wherein minimum requirements are specified for tests of filler metal and welder's test specimens will assure consistently sound welds in a fusion welded structure, is pointed out by James W. Owens, director of engineering, Welding Engineering & Research Corp., New York. Acceptance of these fundamentals was responsible for adoption of the A. S. M. E. codes for unfired pressure vessels and power boilers; also for the navy's purchase of welded boilers for ships under construction.

Proof that physical properties of a weld in a structure are related directly to physical properties of corresponding welds made by the welder in qualification tests was presented in the report of the structural welding committee of the American Bureau of Welding, says Mr. Owens, the investigation covering five years.

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GILBERT E. DOAN, associate professor of metallurgical engineering, Lehigh university, Bethlehem, Pa., points out that commercial availability of heavily-coated electrodes of the type heretofore used privately by several large companies affords for the first time to the welding industry in general an electrode which may be depended upon to produce a ductility of 20 per cent elongation in a 2-inch specimen and is perhaps the most important development in metallurgy of arc welding in the past ten years.

Adoption of codes for pressure vessel welding is an outward evidence of improvement in quality of arc welds supplied by the new electrode, states Mr. Doan. Arc welding has overcome its principal deficiency—brittleness.

While the new code for fusion welding obviously will require early and radical revision, in the opinion of Robert E. Kinkead, consulting engineer, Cleveland, its adoption was a great forward step. It appears likely that the large surplus of structural steel and tank fabricating capacity will be reduced when the movement toward welded construction gains more momentum.

Welding Wire Improved

Results obtained by new developments in welding wire or filler metal for both arc and gas processes were outstanding in 1931, declares C. A. McCune, director of research, Welding Engineering & Research Corp., New York, and this coupled with improved technique and supervision has been responsible for adoption of the new codes. Specifications for welding wire have been revised.

Development of heavily coated electrodes is outstanding and within a few years most of our welding will be done with this type of rod, states Prof. C. A. Adams, Harvard Engineering school, Cambridge, Mass.

Electric arc welding proponents have developed further processes which give improved qualities of weld metal. According to R. D. Thomas, president, R. D. Thomas & Co., Philadelphia, electrodes give physical qualities far in excess of anything previously obtained. A properly made heavy coated electrode deposits its metal under protective atmospheric conditions which eliminate all danger from contamination from oxygen and nitrogen of air. The slag covering formed on the weld bead gives protection against embrittlement through too rapid cooling of the deposit.

Equally important, says Mr. Thomas, is development of arc welding electrodes for various corrosion-resistant and stainless steels. These also are heavy covered electrodes with improved coatings. Welds compare favorably with base metal physically, chemically and in corrosion resistance.

All forms of welding in connection with 18-8 and straight chromium alloys have been remarkable in 1931, both as regards technique and tests to insure proper corrosion resistance, declares L. W. Hostettler, engineer, Allegheny Steel Co., Brackenridge, Pa. Welds heretofore held impractical now are commercial.

Construction of spot welded steel wing structures and a flying boat of stainless steel are 1931 developments in aircraft, writes J. B. Johnson, chief of material branch, air corps, Wright Field, Dayton, O. Spot welding of aluminum alloys has been developed experimentally.

Charles Froesch, general service manager, General Aviation Mfg. Corp., Dundalk, Md., also comments on the welding of corrosion-resisting airplane assemblies and the flying boat, and adds that arc welding has not gained popularity in aircraft manufacture. Aluminum welding in aircraft has progressed little since last year and satisfactory welding of duralumin still is unsolved. The automotive industry is investigating welding of chassis frames.

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IN THE structural welding field, Gilbert D. Fish, consulting engineer, New York, reports that the largest operation probably has been the arc welding in a group of four buildings for Yale university, New Haven, Conn. Only 2500 tons of steel was required, but total cost is approximately $4,000,000. The number of welds is very large, and shows the welding method well adapted to elaborate architecture and that it is possible to obtain competitive bids on welded frames. These buildings have afforded an unprecedented variety of joints designed for welding and have demonstrated possibility of controlling systematically the quality of welding.

An outstanding problem in structural welding and probably welding in general, according to Mr. Fish, is to produce fillet welds of definite and fairly high ductility. Good fillet welds show decidedly less ductility than rolled steel, but no definite degree of ductility is at present prescribed. Improved welding wire or

welding methods may simplify this problem.

Mr. Fish is more than ever of the opinion that close daily supervision of welding operators with frequent informal tests is more effective than infrequent laboratory tests. Recent progress in inspection has been in direction of improved application of old methods rather than development of new ones.

In 1931 for the first time data were published for making preliminary estimates for welding multistory buildings, according to Frank P. McKibben, consulting engineer, General Electric Co., Blackgap, Pa. Weight of electrode required, number of welding hours, number of welding machines required and quantity of electric current can be estimated through use of the data.

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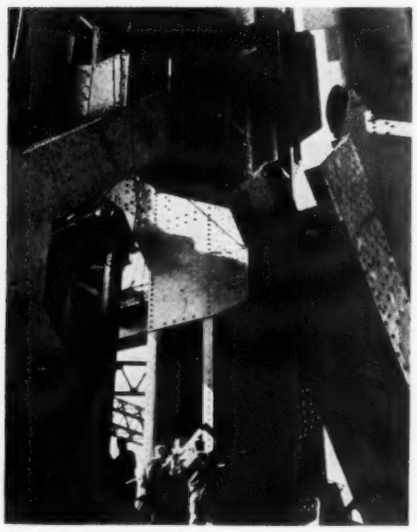
WITH wider adoption of electric welding in building construction, Paul B. Covey, consulting welding engineer, Manchester, N. H., finds a need has been developed for more data on methods for preventing distortion of the welded frames. Other needs are ability to produce smoother and neater welds without use of files or grinders and ability to make clean cuts with the arc.

Completion of work of the structural steel welding committee of the American Welding society was outstanding during the year, in the opinion of Eric H. Ewertz, Eric H. Ewertz & Sons, New York, who says this work provides a true foundation for engineering required in all



types of welded structures. A large number of welded pipe lines have been constructed and more tank construction is of welded design. Rapid progress has been made in all types of machinery using rolled steel members.

Nineteen all-welded yard craft, ranging from barges to tug boats of considerable size, have been built or are building by the navy in 1931 and practically every navy yard is building some kind of all-welded craft, reports Leon C. Bibber, senior welding engineer, bureau of construction and repair, navy department, Washington. On naval vessels proper, welding is being used to such an extent that the welding organizations at various yards will need to be augmented to handle the work.

It is estimated that 300,000 pounds of weld metal will be deposited on the U. S. aircraft carrier RANGER. Remarkable progress has been made in preparation of specifications for welded design and for purchase of welding material and equipment.

General introduction of direct-current generators of materially improved design which deliver energy without splash when the arc is struck and maintain current at substantially constant value, is pointed to as an important development by A. M. Candy, engineer, small motor appliance and welding engineering, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Another innovation is commercial introduction of an alternating-current arc welding transformer equipped with a high-frequency oscillating circuit designed to discharge between electrode and work.

Pipe Welding Continues

Unprecedented construction of pipe lines during the past two years has brought important developments in resistance welding machines, says Mr. Candy. Longitudinal seams in 5/16-inch or thicker pipe 20 inches diameter is flash welded at speeds of 35 to 40 feet per minute. Another type machine welds a whole length of pipe at one time. *Pipe Line News* estimates 16,468 miles of oil, gas and gasoline lines were constructed in 1931 at a cost of $426,700,000, a total almost equal to 1930.

In conclusion, Mr. Candy states that 20 municipalities amended building codes in 1931 to permit welding, bringing the total cities recognizing welding to 108.

Increased use of the shielded arc process in pipe line welding, pressure vessel construction, machinery manufacture, building construction including residences, laying battledeck steel flooring, and ship construction was particularly notable in 1931, declares J. F. Lincoln, president, Lincoln Electric Co., Cleveland.

Wider application of resistance welding has resulted in remarkable improvements in mechanical equipment with hydraulic principles controlling the operation. Hydraulic features have been applied to flash strippers, thereby eliminating vibration during cuts, reports M. L. Eckman, research engineer, Federal Machine & Welder Co., Warren, O. An outstanding development has been made in resistance welders for producing drums and containers. A possibility for the future is the manufacture of hollow stainless steel balls for chemical plant use by resistance flash welding.

Development and application of

Browning Studios, New York

the carburizing flame process for overland pipe welding, observes F. E. Rogers, applied engineering department, Air Reduction Sales Co., New York, who says the process has increased welding speed fully 100 per cent. Speed of welding is 3 to 4 inches per minute measured on the circumference.

Billet skinning or gouging with the oxyacetylene torch has made considerable progress in steel mills. Mr. Rogers also points to increased use of automatic cutting machinery with multiple torches for cutting small shapes from plates and slabs. Improved technique and apparatus was perfected for heat treating rail ends in track with the oxyacetylene torch to increase hardness and reduce wear. Use of the acetylene torch for applying hard surfacing material has gained impetus.

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RIGID economy required during the year has brought a larger use of the oxyacetylene torch in scrapping and reclamation programs, reveals W. B. Miller, Union Carbide & Carbon Research Laboratories Inc., Long Island City, N. Y. The torch also has been called upon to a larger extent for applying hard facings. Gas welding has entered the high temperature and pressure field for joints operating up to 1000 degrees Fahr.

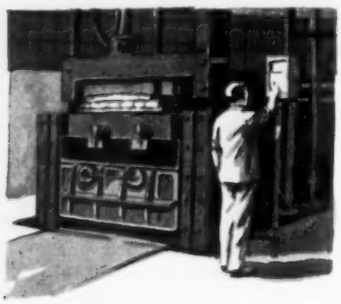
F. Eder, Robert W. Hunt Co., New York, writes briefly that progress in welding technique is expressed in

(*Concluded on Page* 170)

Gas Carburizing Processes Receive Wide Approval

CARBURIZING in gaseous atmospheres stands out as the year's new contribution to heat treating practice and already it has received enthusiastic approval. Other developments deserving attention are progress in temperature control equipment, more efficient furnaces featuring controlled atmosphere, and research work in several directions.

Continuous gas carburizing and carburizing with oil are two notable developments in carburizing, says Frank T. Sisco, editor, Alloys of Iron Research, New York. In the first, flue gas containing CO_2 mixed with a hydrocarbon gas is introduced into the furnace and flows in the direction the



work moves. Close control of carbon, uniformity, speed; cleanliness, continuous operation and simplicity of control are advantages claimed. In carburizing with oil, a retort furnace is used and oil is admitted drop by drop, the oil vaporizing and forming a carburizing gas. This process is said to be economical and efficient.

Study Phase Changes

Important from the theoretical standpoint, states Mr. Sisco, is recognition and study of one of the greatest unsolved problems in constitution and heat treatment of steel, namely, low-temperature phase changes. Work has been reported here and abroad on blue brittleness and age-hardening phenomena in pure iron and low-carbon steel in the temperature range of 50-600 degrees Fahr. and indicates urgent need of further research. Identification of these phenomena with precipitation hardening of duraluminum-type alloys has been a long forward step. It is difficult to gage the future commercial importance of these studies—probably it will be great.

Knowledge has been broadened in the method of nitriding and in proper application of the finished material. According to Mr. Sisco, we have learned new facts about properties of nitrided steel, especially at elevated temperatures. Costs have been reduced until large lots now can be nitrided for about 4 cents a pound.

The container problem is by no means solved; the tendency seems to be toward use of nickel or monel metal boxes. Efforts to shorten nitriding time have been made experimentally and include use of ammonia and nitric oxide, ammonia with other nitrogen-containing compounds, and use of electric arc and ultra-violet radiation.

Concluding, Mr. Sisco reports new installations of furnaces show a continuation of trend toward electricity A new vertical continuous rod and tube hardening furnace has been developed, this being of pit-type construction with multiple retort. One of the newest carburizing and nitriding furnaces is also vertical retort type using oil under pressure for carburizing. Gases are circulated by a centrifugal fan. A new tunnel-type annealing furnace will produce 20 tons of annealed castings every 24 hours; it is fired by gas made in a producer from buckwheat-size anthracite.

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IN THE opinion of J. M. Watson, metallurgical engineer, Hupp Motor Car Corp., Detroit, great improvement has been made in temperature recording apparatus, making it more steady and more accurate. Service upkeep of this equipment should be much less than in the past. Use of the butane-type of heat treating has increased, but the development is so comparatively new that it is not definitely proved.

Gaseous type of carburizing is being given preference to the compound method, continues Mr. Watson. The process is much cleaner and with new types of control should give satisfactory results. Piping of natural gas long distances to industrial centers has been responsible for this development.

That the continuous furnace for carburizing, using gas as the carburizing medium, is the outstanding development in 1931, also is the opinion of E. F. Davis, metallurgist, Warner Gear Co., Muncie, Ind. The gas may be methane, butane or propane. Proper C, CO and CO_2 equilibrium is maintained by introduction of flue gas (CO_2) with the natural gas or other carburizing agent. Chief advantages of this furnace are reduction of time and furnace operating costs.

There has been some advancement in potentiometer control instruments, particularly in ruggedness and wider temperature ranges, observes Mr. Davis. Probably these instruments have about reached the ultimate possible sensitivity for they are far more sensitive than the best of furnaces. Further improvements in closeness of control must come from improvements in furnace design.

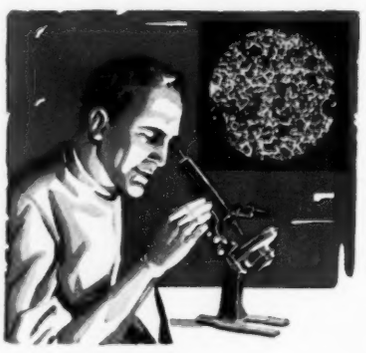
Lack of uniformity in steel from heat to heat is responsible for the majority of heat treating difficulties. Not only does the chemistry vary, but the grain size and character of the micro-constituents. Manufacture of steel still is crude. Decarburization, inclusions and banding still are prevalent and the limited production has been responsible for a degree of deterioration in steel quality in 1931, concludes Mr. Davis.

Greater Control of Atmosphere

H. W. Gillett, director, Battelle Memorial institute, Columbus, O., sees an important trend toward control of atmosphere in heat treating processes and believes in time it will be considered almost as necessary to control composition of the atmosphere surrounding the steel as to control the temperature of the steel.

In nitriding evolution of semicontinuous and continuous furnaces has taken place during the year, according to Victor O. Homerberg, technical director, Nitralloy Corp., New York. This development began several years ago, but it is only within the past year that there has been assurance that necessary nitriding equipment will be available whenever this case-hardening process is adopted on a large scale.

A nitrided cast iron has been evolved. This product is used to a considerable extent abroad for cylinder liners cast centrifugally. Remarkable



service has been noted for the product which is just receiving attention in this country. Research work is being undertaken to study the casting of this alloy composition by usual foundry methods.

Commercial adoption of nitralloy for a crankshaft to operate against an aluminum alloy connecting rod without an intermediate bearing is a re-

cent development. A large automotive manufacturer in France has used this combination with excellent results. Tests in this country thus far have proved successful.

Prof. Homerberg reveals that Mahoux in France has obtained in laboratory tests great surface hardness and a very deep case by nitriding articles while being vibrated actively. Only a short time of exposure to the ammonia is required. Steel compositions not nitridable to any extent without vibration show good properties by this method. Although this work is being conducted mainly on a laboratory scale at present, it may become of great industrial importance in the near future.

Nitriding in Salt Bath

Kinzel and Egan have investigated nitriding by means of a salt bath to obtain a case depth of approximately 0.005 inch. The method was found feasible and is of unquestionable value in nitriding engraving rolls and other products where only a comparatively thin case is required.

The next year, according to Prof. Homerberg, undoubtedly will witness introduction of additional nitriding steels for purposes requiring one or more of the following properties: Less surface hardness, a tougher case, greater physical properties in the core, and lower cost. Nitralloy castings are being made successfully, but additional experience and a more thorough study of technique will lead to production of perfectly sound castings for nitriding. This development is one of great commercial importance and will make rapid progress during this year.

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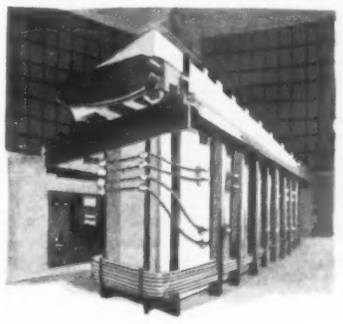
THE greatest unsolved problem in heat treating is the question of resulting quality of steel, in the opinion of Alfred V. de Forest, consulting engineer, Bridgeport, Conn. None of the present methods of test is in general suited to determine the very illusive question of quality of steel. In few cases are endurance or fatigue tests made on finished heat treated articles and when they are it is unusual that impact tests can also be carried out on the same product.

Mr. de Forest believes, however, there is a good deal of evidence that the properties of heat treated steels in respect to these variables are by no means indicated from the ordinary static methods of test.

During the year light has been shed on the complicated problem of quality in heat treated steel from three different angles: Damping properties and internal friction by Von Heydekampf; impurities and measurement of body by Kinzel; and measurements of ductility by Emmons.

From these investigations, says Mr. de Forest, it is apparent that the most important question in heat treated steel is quite independent of further refinements in heat treating methods. The most important development will come from the increased quality of the steel itself and for this purpose methods of test must be developed which will measure this property or group of properties in finished parts as well as in testing machine samples.

The annual report of the iron and steel division of the American Society of Mechanical Engineers records the statement that experimental work on the heat treatment of full-sized rails was continued in 1931 and it is understood that a process which is commercially feasible has been developed. A method of cold treatment, the opposite of heat treatment, was perfected during the year, this process having for its purpose the development of the necessary high-strength properties of certain austenitic steels. The treatment is applied to the article in its final polished condition and



appears to have many useful applications.

C. L. Ipsen, industrial department, General Electric Co., Schenectady, N. Y., reports that his company has made two installations of electric furnaces for bright annealing coiled strip steel. Each furnace consists of a bell-type heating chamber and several bases upon which the coiled strip is stacked. An inner hood or cover of heat-resisting alloy is placed over the stack and serves to exclude air both during heating and cooling. An atmosphere of illuminating or other suitable gas is maintained under the hoods.

Advantages of this type of furnace, says Mr. Ipsen, are saving in time for annealing, saving in floor space and handling, and improved quality of product as regards uniformity of anneal and surface condition.

One installation of these furnaces is used almost exclusively for annealing high-carbon strip. This material is liable to decarburize during annealing and unusual precautions have been necessary in the past. With a suitable atmosphere maintained under the hoods in the electric furnace, it has been found practical to anneal this material to correct temper without decarburization. This is a result of the accurate control of the temperature and time cycle as well as atmosphere.

Referring to the review on foundry practice on Page 166 of this issue of STEEL, it will be noted that several comments are made on improved heat treating of castings, including steel, malleable and gray iron. Many steel castings now are given differential heat treatments previously considered impossible, thereby developing better physical properties. Installation of improved equipment has been required to accomplish this end.

Nitriding of malleable cast iron has been investigated with satisfactory results, although technique of the process is not as yet completely perfected. Notable progress has been effected in heat treatment of cast iron.

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INSULATION has played a part in advancement in heating operations, most activity having been in the small furnace field, declares S. M. Jenkins, assistant sales manager in charge of high temperature insulation, Armstrong Cork & Insulation Co., Lancaster, Pa. Furnace building companies have chosen insulation and the thinner wall made possible by its use as a part of latest constructions. Present day furnaces are more like conveying machinery made of alloys surrounded by walls of refractory, insulating brick and steel outside shells which give wearing surface as well as prevention against air infiltration.

In one method of construction, certain sections of the furnace wall free from abrasion are built entirely of insulating brick; other sections are built of insulating brick and faced with firebrick to provide for wear or heat storage. Insulating brick are laid and faced with a thin refractory cement where no heat storage is desired. This latter construction has been used recently on doors of old furnaces.

Simplify Weekend Blast Furnace Shutdowns

(*Concluded from Page* 156)

and collectively work out its problems of the present situation over the short or long pull, to the economic good of the industry and the men employed in it.

A development of considerable importance in blast furnace stove practice, comments J. Spotts McDowell, director of research, Harbison-Walker Refractories Co., Pittsburgh, has been the trend to use checker brick of increasingly high refractoriness. First-quality firebrick now are being used generally throughout the setting. A number of companies have found it economical to specify high-alumina checkers of the 50 per cent alumina class for the upper courses of the stoves. The advantage of this brick is its superior resistance to the fluxing action of the alkalies.

New Machine Tools Inspire Revisions in Marketing

DESPITE continued business depression through 1931, the wave of engineering activity which arose in the previous year, has gone on and still goes on in the machine tool industry. New designs, which in 1930 were considered radical, were proved practical in 1931 and were influential in developing and in closing the several sensational machine tool orders which now and then punctuated a generally discouraging market.

The past year will go down in industrial history not only as one of the periods of revolution in design, but also as one of revolution in marketing methods. At this time design trends are more definitely marked, possibly being further advanced than are changes in marketing methods. In analyzing the significance of numerous changes in sales policy, one is inclined to believe there is a leaning toward dealer distribution. In any event, more intensive cultivation of markets is being sought with reduced sales expense also an objective.

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ERNEST F. DUBRUL, for ten years general manager, National Machine Tool Builders' association, and now a consulting management engineer in Cincinnati, considers well planned replacement policies to be vitally needed today. He points out that many manufacturing companies have in effect turned their business over to wiser competitors, simply because of managerial policies which invested depreciation deductions in inventory assets, instead of putting them into equipment of modern design. Mr. DuBrul is convinced that the equipment industry faces the pressing necessity of educating equipment users to the need for establishing economically-sound financial plans for systematic replacement of machinery.

Mr. Du Brul believes that such a campaign of education can be and should be initiated and conducted jointly by all the equipment industries. He points out that actually there is nothing new or startling in this idea. Such a plan has been carried on effectively in Germany for nearly 30 years by Verein Deutscher Machinenbau Anstalten, which is a federation of about 70 distinct trade associations of machinery builders. While Mr. Du Brul admits that it will be a man-size job to organize a comparable campaign in the United States, he is sure that it can be made a factor of major importance in helping this country back on the road to prosperity.

With the automobile industry one of the few sources of worthwhile machine tool orders in 1931, and admittedly holding the brightest hopes for business in 1932, the views of the machine tool situation taken by D. A. Wallace, vice president in charge of manufacturing, Chrysler Corp., Detroit, carry weight. Mr. Wallace considers that by far the most important thing which machine tools of 1931 show, is the much more general adoption of welded steel frames. He believes that this will be a vital factor in machine tool production in the future. It is pointed out by him that properly designed frames fabricated by this method not only are more rigid than conventional cast frames, but also can be handled in a factory without constant danger of breakage.

Mr. Wallace points with approval to recent simplification in hydraulic feed and control mechanisms. Along with welded frames and simplified hydraulic mechanisms, he classes antifriction bearings and hydraulic change gear devices as virtual necessities under modern production conditions. He believes that proper layout of a shop eliminates to a large degree desirability of machines which are so special that they cannot be diverted to new uses when product design is changed.

Aim for Quiet Operation

Mr. Wallace strongly recommends that machine tool builders now turn their attention to quieting the operation of their machines, through proper use of rubber cushioning and through better workmanship.

The electrical industry is another of the major markets for machine tools and is one in which are arising some of the most logical replacement plans, as well as definite ideas as to what constitutes good production machine tool design. J. R. Weaver, superintendent, manufacturing equipment department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., offers constructive suggestions.

In the first place, he sees definite benefit in the depression, in that it has given machine tool builders time to make a critical survey of their designs, and to bring out new models suitable to meet conditions of the new industrial era into which he is confident we are entering.

Mr. Weaver says that cemented-carbide cutting materials have achieved an important place in production practice and that in 1931 their use not only has saved a great deal of money for manufacturers of metal products, but also has enabled formerly impossible machining operations to be performed. He sees no escape from the necessity of redesigning production machine tools for safe, vibrationless operation at extremely high speeds, pointing out that manufacturers of high-speed steel lately have improved their materials to a point where these characteristics are almost as important with high-speed steel tools as with the cemented carbides.

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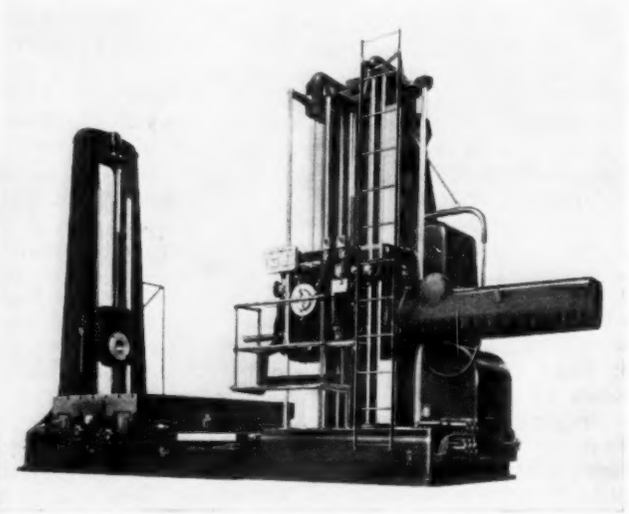
MR. WEAVER recognizes a decided tendency to abandon the mechanical method of producing feeding and other movements in machine tools, in favor of either simplified hydraulic or electrical means. Also, the conventional single motor drive is giving way to multiple motor drives, each motor performing a particular function in the machine, thereby eliminating numerous gears and connecting shafts. Among factors acting to bring down production costs, Mr. Weaver mentions particularly, improved methods of loading and unloading work in the machine itself, and conveyor handling

CONTROL of large machine tools is brought to operators' finger tips by means of centralized pushbuttons with flasher signals, in conjunction with subdivided electrical drives and torque motors for locking slides



of the work to and from the machine.

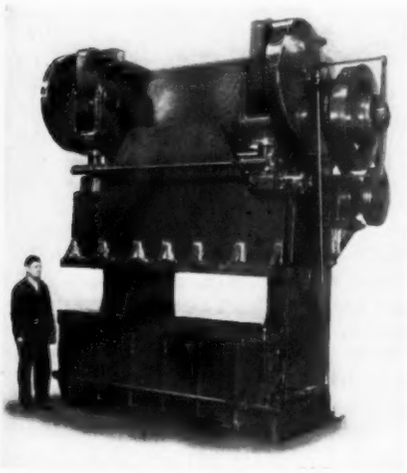
He believes that the machine tool industry should concentrate on the problem of systematic equipment replacement, and should try to co-ordinate the best points of numerous suggested plans into one definite system. Then, according to Mr. Weaver, it largely will be up to machine tool salesman to "sell" that system to users.

Thomas R. Jones, vice president and general manager, Harris Seybold Potter Co., Cleveland, (printing machinery), believes that early disappointments in cemented-carbide cutting materials were due to overexpectations by sponsors of these materials. Mr. Jones, who formerly was an official of Cincinnati Milling Machine Co., is of the opinion that only recently has full realization of the requirements for proper development of cemented-carbide tools been brought out.

Evolution Slow but Sure

Initial fear on the part of machine tool builders that tremendously increased speeds and feeds would be demanded almost overnight, now has given way to realization that such evolution will be relatively slow, though none the less sure. In the meantime, manufacturers of high-speed steel are having time to improve their products along lines which also will influence machine design.

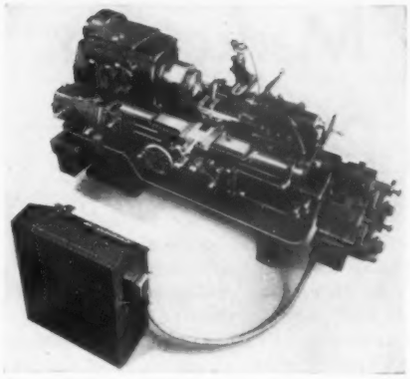
Mr. Jones is convinced that the present accounting method of handling depreciation does not provide adequately for machinery replacement, depreciation merely representing a reserve, or reduction from assets, which as a matter of fact provides no fund from which replacement equipment can be purchased. It is entirely possible to



Neat appearance, as well as strength, is noticeable in machine tools with welded rolled steel frames

pay dividends out of this money which actually should be applied to new equipment, without even the realization that this is being done.

A manufacturing organization which is attracting widespread and favorable



Automatic control of machine tools by electrical means has been broadened in its production applications

attention through its successful system of equipment replacement, its plan for controlling the employment situation, etc., is Geometric Tool Co., New Haven, Conn. (production threading equipment). According to James W. Sneyd, vice president of this company, there is a definite trend in machine tool design toward simplicity, even though the designs embody refinements such as hydraulic feeds and electrical control, lower operating and maintenance costs being the desirable end in view. Admitting the fundamental importance of new and improved cutting materials—high-speed steels as well as cemented carbides—Mr. Sneyd calls attention to the almost equal importance of recent improvements in heat treating, not only of cutting tools but of alloy steel machine parts as well, as an influence on machine shop practice.

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AS A CONSULTING engineer specializing in tooling up and organizing plants for mass production, as well as in the development of new products, George T. Trundle Jr., president, Trundle Engineering Co., Cleveland, has an unusually broad perspective on modern machine shop practice. After commenting upon the fact that in a period of about 75 years the average level of metalworking technique has risen from that of the old-fashioned blacksmith shop to that of the high-speed automatic machine, Mr. Trundle mentions some significant points which have come to his immediate attention recently.

In the first place, Mr. Trundle mentions as a decidedly important trend of 1931 that toward attaining more flexible control of heavy machinery, including remote control from more than one point. As the greatest contributing factors in this direction, he ranks recent improvements in hydraulic transmission of power in machine design and the application of automatic electrical control, including practical adaptations of the photoelectric cell.

As far as cemented carbides, anti-friction bearings, and fabrication of machinery by welding are concerned, Mr. Trundle states that these things definitely have "arrived" as recognized factors in production machine shop practice. He mentions particularly that during 1931 it was demonstrated that welded products can be designed to have pleasing appearance as well as desirable physical qualities.

As aids to engineers in eliminating vibration and shock from today's high speed machinery, Mr. Trundle gives credit to recently perfected apparatus for vibration analysis and for balancing, the use of which increased rapidly in the past year. He sees in specially designed shock absorbing mountings the remedy for many of the vibration and noise difficulties.

To insure profitable operations in the immediate future, it will be necessary in many cases to redesign manufactured products to attain better quality and more economical production. In this connection, Mr. Trundle recommends careful analysis at this time of markets, distribution, mate-

Hydraulic systems now constitute an integral part in the design of many production machine tools

rials, manufacturing, inventory control, organization and management.

It is fitting to conclude this review with an opinion expressed by one who many years ago learned the machinist's trade and worked at it successfully, and who today is recognized as a leading authority both in engineering and in economics. Dr. Dexter S. Kimball, dean of the college of engineering, Cornell university, with this background sees prospects of further great advances in the materials of engineering within the near future, which will be reflected in machine tool design.

Recalling a statement made to him by the eminent machine tool builder, James Hartness, to the effect that machine tool progress has been a series of periods of slow evolution, punctuated by an occasional new and radical idea, Dean Kimball expresses his conviction that what the machine tool industry needs most is a greater number of stimulating new and radical ideas to insure steady progress.

Foundries Study Markets in Low Production Period

BESIEGED by record low rates of production and often ruinously low prices, the foundry industry has looked at the passing of 1931 without regret. Faced with cutting costs to the bone to maintain existence, foundries have had little opportunity for extensive development or research, although study of new uses for castings was unhampered. But, forgetting the past, the industry is looking to the future with mixed feelings of confidence and hope.

Revival of automotive production, agitation for extension of public improvements, endeavors of public utilities to take advantage of low material and labor prices, an impetus to residence building, and improvement in steel mill operations are factors which Dan M. Avey, editor, *The Foundry*, Cleveland, expects to stimulate foundry production.

Mr. Avey points out that the steel foundry industry, although probably establishing a new low total tonnage output in 1931, has entrenched itself firmly for gaining new markets this year. Elimination of many foundries from jobbing lines, although often disastrous to individual companies, has reduced capacity and should benefit the industry.

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REALIZING that the foundry product always will be in demand, makers of equipment, with full confidence in the future, are taking advantage of slack conditions to develop new lines, and in many other respects get in shape to be of still greater service to the industry when business improves, states H. S. Simpson, president, Foundry Equipment Manufacturers association, Chicago.

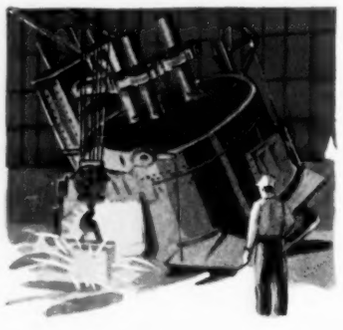
N. K. B. Patch, secretary, Lumen Bearing Co., Buffalo, declares competition among foundries has forced cost reductions which in turn have compelled foundrymen to devise short cuts, improved methods and waste reduction, without impairing quality of product. Need for development of the technical end has been emphasized the past year, according to R. F. Harrington, metallurgist, Hunt-Spiller Mfg. Co., Boston, who concludes the user of castings today must be reasonably sure of the fitness and reliability of a given casting for a given job, the net result being a closer co-operation between engineers and foundrymen.

In the steel castings field, Granville P. Rogers, managing director, Steel Founders' Society of America Inc., New York, notes progress of the steady, nonspectacular type, with a further application and development of special alloy steels to meet special service requirements, a greater development in manufacture of castings for high-pressure fittings and a growing tendency toward use of steel castings in connection with fabricated structures, particularly small castings in conjunction with welded structures.

Specify Heat Treatment

Mr. Rogers notes also development of improved heat treating methods, including heat treating of castings to give better physical properties, and perfection of special heat treatments for alloy steel castings. Many castings today are given differential heat treatments which were considered impossible previously. Mr. Rogers sees a definite advance toward better quality and reduced costs, as well as rationalization of relations between riveting, welding and casting, removing these methods from the controversial stage.

Considerable useful information has been brought out regarding relative properties of cast and wrought alloy steel as to corrosion, abrasion, erosion and distortion at high temperatures, in the opinion of R. A. Bull, director, Electric Steel Founders' Research Group, Chicago.



Authorities generally agree that a notable achievement is greater co-operation between foundrymen and castings users. W. H. Worrilow, president, Lebanon Steel Foundry, Lebanon, Pa., comments on this trend, and S. W. Utley, vice president and general manager, Detroit Steel Casting Co., Detroit, adds that scientific metallurgical control is becoming more and more a strong factor in foundry operations, with scientific handling of such problems as sand control, heat treatment, etc., becoming a part of the daily routine of an increasing number of foundries.

John Howe Hall, technical assistant to the president, Taylor-Wharton Iron & Steel Co., High Bridge, N. J., remarks that in the face of constantly dwindling business, for foundries to have reduced costs sufficiently to be able to remain in business and face the present year with a feeling of confidence is a real achievement. Mr. Hall discovers a marked trend in foundries making light steel castings—the further development in manufacturing castings of corrosion-resisting steels, such as 18-8 and similar analyses.

A number of steel foundries, in which the expenditure could be met safely, have supplemented their organizations with technical staffs to develop new uses for castings, points out J. E. McCauley, vice president and general manager, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.

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IN the gray iron field, A. E. Hageboeck, president, Gray Iron institute and president, Frank Foundries Corp., Moline, Ill., sees as a signal achievement the fact that the Gray Iron institute has weathered the depression thus far without losing support of its membership, signifying that gray iron foundrymen now are alive to the new order of business, and are willing to co-operate and help an organization which is doing much for the betterment of the industry.

Work done at the bureau of standards, Washington, by research associates of the American Foundrymen's association on shrinkage of metals and casting properties of metals impresses James T. MacKenzie, metallurgist, American Cast Iron Pipe Co., Birmingham, as an important contribution. Mr. MacKenzie also commends the work of the technical department of the Gray Iron institute, and further states that production methods have been keyed up to the extent that return of business will see only the best qualified foundries in the field. In the cast iron pipe industry, an important development was the design of the rubber ring type of joint to withstand pressures as high as 500 pounds per square inch, Mr. MacKenzie adds.

W. Worley Kerlin, metallurgist, technical department, Gray Iron institute, Cleveland, sees numerous inquiries as to improvement of melting practice, received at the institute, as revealing that foundrymen are more interested than ever in producing superior gray irons. Adoption of a standard charging sheet and daily melting log is an example of progress toward this end. Trend

of engineering developments among castings users, states Mr. Kerlin, reveals a need for specifications that will identify gray iron as a reliable material.

Real progress in gray iron technology has been recorded, in the opinion of J. W. Bolton, metallurgist, Lunkenheimer Co., Cincinnati, accompanied by much more interest in engineering properties of gray iron. More electric melting furnaces are coming into use and notable progress has been effected in heat treatment of both plain and alloyed cast iron, states R. S. MacPherran, chief chemist, Allis-Chalmers Mfg. Co., Milwaukee.

Surveying developments in the malleable iron industry, Enrique Touceda, consulting engineer, Malleable Iron Research institute, Cleveland, points to the fact that malleable iron side stakes were selected for use in construction of 1500 special gondola cars for the Pennsylvania railroad as evidence of the good physical properties of high grade malleable (STEEL, July 9, 1931).

Machinability Undergoes Study

During 1931 considerable work on machinability of malleable iron as compared with other products was carried out at the University of Michigan, Ann Arbor, Mich. Mr. Touceda also states that one plant has investigated the nitriding of malleable castings with satisfactory results, although technique of the process is not as yet completely perfected. An innovation in equipment is a small car-type annealing oven, fired by pulverized coal, making possible heat treatment of two 8-ton charges per week.

Mr. Touceda further states that some malleable iron plants are making a special product which, while it is not malleable iron, is of higher average ultimate strength and yield point, although its ductility is somewhat lower than high-quality malleable. The product's structure consists of uniformly distributed nodules of temper carbon in a matrix of pearlite.

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A DISTINCT forward step, in the mind of J. B. Deisher, plant manager, Columbia Malleable Castings Corp., Columbia, Pa., is the increase in malleable iron specifications introduced by the Malleable Iron Research institute. The symposium on malleable cast iron, sponsored by the American Society for Testing Materials, Mr. Deisher considers an outstanding educational achievement.

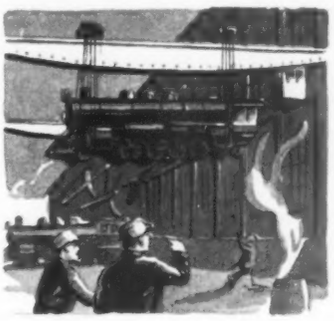
In the pressure casting or die casting branch of the industry has come successful introduction in this country of the so-called "press casting" process. Charles Pack, consulting engineer, New York, commenting on this innovation, states that products of this process closely resemble die castings but are broader in their scope, such products as brass, magnesium, aluminum and stable zinc pressure castings being made, which are not available in die castings.

D. L. Colwell, metallurgist, Stewart Die Casting Corp., Chicago, suggests that perhaps the most important development in the technical end of the business of die casting was the further improvement in zinc-base die casting alloys, with the result that engineers are realizing more and more that the present zinc-base alloy can be depended upon for accuracy and permanent size, and permanent physical characteristics.

Need for Reducing Materials Handling Costs Is Impetus to Mechanization

ALTHOUGH mechanization of industry was curtailed in 1931, progress in materials handling went forward principally from necessity to reduce production costs. Car dumpers, cranes, hoists, trucks and tractors and conveyors all have undergone redesign and have emerged with refinements in operation and control. Units more nearly meet demands of special service, both as to materials of construction and function. Adaptation of conveyor units has been particularly notable, with automatic features attracting attention. Co-ordination of handling facilities has advanced, but this is the major objective ahead.

Material handling no longer is a discussion, according to Frank F. Seaman, general manager, hoist and



crane division, Robbins & Myers Sales Inc., Springfield, O., but rather a problem as to what type of equipment will be used.

Savings and advantages resulting from materials handling equipment in most cases are dependent upon normal capacity operations, for that reason installation of new equipment was curtailed in 1931. With improving conditions, William W. Sayers, chief engineer, Link-Belt Co., Chicago, says industry will be obliged to purchase to expedite handling and reduce costs.

Gondola car dumpers for quickly overturning and emptying railroad cars at minimum expense received greater acknowledgement of merit and general application. Conveyors meeting practically every handling condition have been improved and installed during the year, this applying to belt conveyors, skip hoists, trolley bucket conveyors, screw conveyors, apron conveyors, flight conveyors, drag conveyors, chain and bucket conveyors and power hoes.

Mechanical conveying equipment enters into expediting deliveries, enlarging plant handling capacities and reducing industry's production costs to an amazing extent, states Mr. Sayers.

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TREND in handling operations has been toward simplification, speed and improved quality of product, observes W. J. Ramsay, sales department, Mathews Conveyer Co., Ellwood City, Pa. Trend in design is toward antifriction bearings, more exact speeds, better quality working parts, equipment as light as possible to do the job and co-ordination of equipment.

Depression has stimulated use of handling equipment to reduce production costs. New applications of mechanization listed by Mr. Ramsay are in manufacture of spiral welded pipe, fabrication of structural shapes, sheet handling in all forms and plate handling. Progress has been most notable in handling sheets through operations from furnace to rolling, to storage, reroll and to shear operations; and in coil handling conveyor systems.

Complete tie-up of process, synchronization of movement and quantities handled may be expected in materials handling in the future, says Mr. Ramsay. Further development and application of electrical features, including automatic operation, is anticipated.

Eventually, the 18-8 chrome-nickel steel may be used in conveyor systems where corrosion may result from materials handled, but at present its cost is too high. This was the opinion of N. W. Elmer, consulting material handling engineer, Oak Park, Ill., expressed at the recent meeting of the American Society of Mechanical Engineers.

Service of Refractories Is Improved During 1931

CONTINUING a trend noted in 1930 in the refractories field and aided by closer technical control of manufacturing processes, high-alumina refractories of the mullite and sillimanite type came into wider use during 1931 in electric furnaces, open hearths, high-temperature kilns and blast furnace stove checkers. This material has high refractoriness, improves with age if exposed to high temperature, has rigidity under high pressures at high temperatures and is little affected by oxidizing or reducing gases.

The past year also saw strides made in improving chrome and magnesite brick, with reductions in spalling loss and increases in hot load strength. Much attention has been given to insulation of open-hearth furnaces, regenerators, soaking pits, flues, etc.

Investigating New Refractories

Beryllium oxide and euhedral corundum are two new types of refractories being subjected to experiments to determine their suitability, according to Hobart M. Kraner, superintendent, Derry Works, Westinghouse Electric & Mfg. Co., Derry, Pa., who points out that the former is being used as a crucible refractory in laboratory research work on gases in metals; utility of the euhedral corundum is not clearly determined. Silicon carbide is being used advantageously in the throats of open-hearth furnaces, in billet heating furnaces and pipe normalizing furnaces, where abrasion is serious.

A. E. R. Westman, Ontario Research Foundation, Toronto, Ont., sees closer technical control increasing the uniformity and quality of firebrick with practically nonspalling clay brick being made by carefully controlled coarse grinding. He also notes the introduction of new insulating refractories combining high insulating value with the refractoriness and other properties, except slag resistance, of high-grade firebrick.

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IN THE insulation field, rapidly gaining prominence, activity has been principally in the realm of the smaller furnace, or in handling steel after it has left the open hearth and soaking pit, in the opinion of S. M. Jenkins, Armstrong Cork & Insulation Co., Lancaster, Pa., who points out further that insulation of open hearths has not only cut heat losses measurably, but also by sealing the unit against air infiltration has aided greatly in the development of automatic control for reversing.

Mr. Jenkins likens present-day furnaces to conveying machinery, made of alloys, surrounded with walls of refractory insulating brick and steel outside shells which give wearing surface besides preventing air infiltration. A new construction method has been tried—building certain sections of a furnace wall entirely of insulating brick if there is no abrasion or cutting action. In other sections the insulating brick are faced with a thin layer of firebrick for a wearing surface or for heat storage. Insulating brick are laid and faced with a thin refractory cement where no heat storage is desired. Some progress has been made along these lines on old furnaces where insulating brick have replaced firebrick in furnace doors, and in these cases the brick are faced with a thin coating of high-temperature cement.

That the trade as a whole is beginning to appreciate more and more advantages of lightweight so-called semirefractory materials for furnace linings, especially in the electric furnace field, is the contention of R. D. Van Nordstrand, engineer, industrial heating engineering department, General Electric Co., Schenectady, N. Y., who adds that refractory manufacturers and engineers are co-operating to a greater extent, so that special designs are more easily manufactured. He sees as one of the major problems need for a furnace tile which can be manufactured more quickly than four or five weeks.

George A. Balz, mechanical engineer, Perth Amboy, N. J., concludes that the depression has had a serious effect on refractory users and manufacturers, but that the introduction of mullite has been followed up by an ever-broadening field where its desirable characteristics may be applied advantageously in severe service. An excellent and progressive standardization and improvement in regularity of size and quality of refractories is noted by F. H. Willcox, vice president, Freyn Engineering Co., Chicago, as well as improvement in refractory life and decrease in expense.

Duplexing gray iron in rocking-type electric furnaces has been hindered somewhat due to failure of refractories to stand up under scouring action of the extremely hot metal bath, according to F. H. Riddle, director of research, Champion Porcelain Co., Detroit, but the problem is solved by the use of so-called ramming mixes, made of grains of various forms of mullite sized to give the greatest possible density with as little plastic clay bond as possible. Electric furnace builders have found that these mixes, made from the molten cast mullite, andalusite, cyanite, argon, etc., can be rammed and heated at once.

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IN BLAST furnace stove practice, a development of considerable importance has been the trend to use checker brick of increasingly high refractoriness. First quality firebrick are being used generally throughout the setting, and a number of companies have found it economical to specify high alumina checkers of the 50 per cent Al_2O_3 class for the upper courses of the stoves. These points are brought out by J. Spotts McDowell, director of research, Harbison-Walker Refractories Co., Pittsburgh, who adds that improved manufacturing methods are changing the practice in regard to construction details of blast furnace bottoms. A decided improvement in the uniformity of the size of bottom blocks has resulted from adaptation of the power pressed process to their manufacture.

Need Hard and Dense Brick

Due to the tendency to use a greater percentage of sinter in blast furnace charges, more attention is being given to providing hard and dense brick for furnace inwalls to withstand abrasion, in the opinion of Jay J. Seaver, vice president, H. A. Brassert & Co., Chicago. At the same time, however, the brick should be of an analysis giving the greatest heat resistance compatible with hardness. Mr. Seaver also states that high-temperature cements are being used more extensively for bonding firebrick in blast furnace linings.

Merrell Cox, Arthur G. McKee &

Co., Cleveland, contends that the greatest improvements in brick for blast furnace stoves have been along the line of developing nonspalling brick for stove domes and the top brick in the checkerwork. He also cites a new method of making checker tile of the nested type, in which the extrusion process has been supplanted by a die pressing method.

Open-hearth operators have achieved good results and low operating costs with furnaces using mineral bonded, hydraulically pressed unburned magnesite brick in front and back walls, monkey walls, end slopes, bridgewalls and downtakes, points out R. P. Heuer, director of research, General Refractories Co., Philadelphia, who further states that insulation of open hearths and other high-temperature furnaces has been given more consideration during 1931, necessitating more study of refractories suitable for use in conjunction with insulating materials. The future will demand refractories possessing greater volume stability at high temperatures and higher softening points under static load, Mr. Heuer declares.

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THE past year saw the introduction of a new chrome brick, hot load strength of which was increased 300 degrees Fahr., or about 12 per cent. R. E. Griffith, manager of refractories sales, E. J. Lavino & Co., Philadelphia, outlining some of the salient features of this new brick, states that spalling loss due to rapid heating and cooling has been reduced from 15 to less than 4 per cent, and that increased density, more rugged physical structure and greater chemical stability are provided.

Other new chrome products mentioned by Mr. Griffith include a wet chrome cement possessing the smoothness and plasticity of a fine fireclay, and a plastic chrome coating material for applying to any refractory structure where a neutral surface is desirable. Use of chrome ore in plastic form in the hearth and walls of slag tapping boilers also has increased greatly.

Most important among developments in magnesite brick, according to Mr. Griffith, is the new periclase brick, analyzing above 90 per cent in MgO and with low iron content. This brick shows many advantageous physical properties and is claimed to give economical service in roofs of open-hearth furnaces.

A representative of a leading steelmaker of the Middle West notices considerable improvement made during the past year in the workmanship of all brick, especially in the clay brick field. Improvements also have been made in the so-called nonspalling magnesite brick. A dry pressed silica brick is now on the market and its shape has been bettered.

This authority also considers worthy of mention the appearance of a new high fusing insulating brick which, although capable of better physical properties, still is outstanding in its field.

Operations at the present, which make necessary frequent shutting down and starting up of furnaces point to a problem which has been present continually—the spalling and high repair costs of furnaces constructed with silica brick. This difficulty indicates the need for developing the physical characteristics of silica brick.

Coating Industry Recognizes Prestige of Deep, Side-Heated Galvanizing Pots

ACHIEVEMENTS effected by the galvanizing industry in 1931 embody the development of what is known as No. 20 flux, which replaces muriatic acid and eliminates the necessity for using sal ammoniac. Being neutral in its activity, comments W. H. Spowers Jr., consulting engineer, New York, this flux reduces dross consumption in kettles materially.

Another step in advance, especially in continuous processes, such as wire, has been the development of the new bright dip cleaning method which produces a surface mechanically and chemically clean. Some remarkable coatings have been obtained by the use of bright annealing equipment prior to galvanizing. The new technique affords 4-minute wire with not more than 6 or 7 inches of spelter immersion.

Firing Methods Revised

Deep kettle installations with proper technique in firing have continued to forge to the front. Application of diffusion flame burners to the galvanizing installation, Mr. Spowers emphasizes, is proving revolutionary in kettle firing.

New equipment of particular interest to the galvanizing industry is a line of continuous cleaning, rinsing and drying machines; continuous pickling equipment for small parts; and a new slinger for removing excess zinc from small articles after the coating has been applied, according to the observations of W. G. Imhoff, president, Wallace G. Imhoff Co., Vineland, N. J.

Another achievement, comments Mr. Imhoff, is a new pickling machine with the parts made of special metal and acid-resisting bronze. Continued study is being made relative to the cause and prevention of white rust on coatings, the writer states. Alloy coating for protecting zinc surfaces also is a development of the past year. Pickling tank design now incorporates vulcanized rubber linings and acid-proof brick and cement.

Pails now are hot galvanized by machinery developed during the year just closed. The wire galvanizing industry the past year witnessed the installation of an electric galvanizing furnace. The pot is of the deep type with heat application on the sides.

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IMPROVED workability of acid-resisting enamels is one of the accomplishments of the vitreous coating industry for 1931, states R. A. Weaver, president, Ferro Enamel Corp., Cleveland. A metal cleaner and a new color chart also are recent developments and will assist enamel shops materially. The industry has witnessed the first installation of a large enameled metal tile manufacturing plant and Mr. Weaver discloses the first exterior porcelain enameled metal residence will make its bow this year.

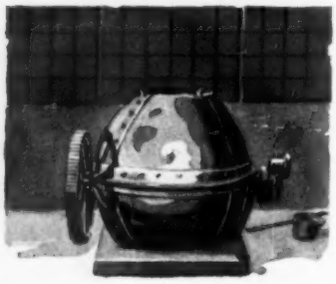
A cross-section of the wall includes plaster on metal lath, a steel frame, 4 inches of insulating material backed by ½-inch fiber board and finally porcelain enamel steel on the exterior. The enamel exterior siding will be in the form of shallow rectangular pans with enamel battens covering the joints. While the enamel units may be in any commercial color, the first house will have matte-glaze porcelain about the color of buff limestone. Kitchen, lavatories, bath and recreation room will be lined throughout with porcelain enameled steel.

Steelmakers Striving for Low-Cost, High-Quality Ingot Production

(*Concluded from Page* 157)

ference in the checker temperatures between one side and the other, are sufficient to cause one furnace to perform poorly and its adjacent neighbor to produce large tonnages.

And so automatic control, states Mr. Dobrin, has come to be recognized as a useful means of standardizing general good conditions and of eliminating weakness due to the human element. As a result, standards of performance now are being



relegated to the background. It is not uncommon to find a practice of 4 million B.t.u. per ton of steel melted in plants where 6 or 7 million B.t.u. per ton had been accepted as the expected performance. Yields, tons per furnace hour and furnace life have increased in many cases.

Furnace Controls to the Fore

The question of combustion and other furnace controls, concludes Mr. Dobrin, at first occupied the attention of certain technical groups, but these problems now are being considered prominently by executives who usually are called upon to authorize expenditure of funds for these purposes. As a result, managements generally are more sympathetic toward requests from their staff for outlays for these improvements. Over 50 open-hearth furnaces are equipped with various controls, and even greater progress is expected in the immediate future.

A decided swing toward the use of chrome brick as a backup refractory for ground magnesite as used around the hearth and ports of open hearths is observed by W. C. Buell, open-hearth department, Arthur G. McKee & Co., Cleveland. Its use as a lining for monkey walls, ports and downtakes also is increasing. While the use of the neutral chrome rather than the basic magnesite in basic practice is chemically logical, the increasing use of chrome brick has come through improved manufacturing methods which have enhanced physical qualities of the brick and reduced cost to a figure substantially lower than magnesite brick.

Silica brick for open-hearth roofs, states Mr. Buell, now are specified to be true to a straight edge on the longitudinal surfaces. Brick manufacturers have been obliged to improve kiln practice to meet this specification, and a general improvement in the brick has followed. This betterment shows up in longer roof life which can be increased still further when roofs are designed on sound basic theory and installed in accordance with such theory.

Use of insulating material is increasing, concludes Mr. Buell, several roofs being at least partially built along this line. Trials have been made in insulating the top of the pan. Insulation of the entire furnace system to the charging floor at the uptakes in the newer furnaces has been accomplished.

High-alumina brick are finding wider steel plant uses which eventually will lead to a considerable increase in the application of these refractories, comments J. Spotts McDowell, director of research, Harbison-Walker Refractories Co., Pittsburgh. Where open-hearth checkers have been topped out with high-alumina brick of the 50 per cent alumina class, the life of these upper courses in a number of cases has been double that obtained with first-quality fireclay brick. Operation difficulties are decreased since the high-alumina brick do not fuse so readily and the fluxing action due to ash is greatly reduced.

Welding Code Adoption Is Stamp of Acceptance

(*Concluded from Page* 161)

such achievements as use of the carburizing flame in gas welding.

Also commenting briefly, R. E. Fritsch, vice president, Tube-Turns Inc., Louisville, Ky., reveals that on a percentage basis, more new piping jobs in 1931 were specified to be welded than in 1930.

Rapid extension of atomic hydrogen welding and automatic and speed welding in the acetylene field are commented upon by J. H. Deppeler, chief engineer, Metal & Thermit Corp., New York. In the thermit field, he says that rail welding has been accomplished without interruption to traffic.

Because it is older and because it is not spectacular as is welding, riveting as a process for joining metal structures receives little publicity. Nevertheless, in spite of inroads of welding, riveting has increased over a period of years principally because of the growing use of steel construction. Steady progress has been made in rivets and riveting practice.

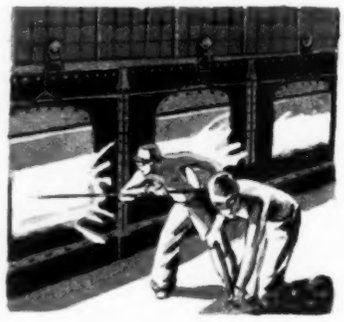
Riveting Costs Lower

Lee H. Miller, chief engineer, American Institute of Steel Construction, Cleveland, is authority for the statement that industry at present is more interested in what it will do rather than how it will do it. Every fabricating shop is equipped to supplement riveting requirements with welding where it is economical and permitted by regulations.

Riveting costs still are lower than welding for large structures, therefore, he says, welding reaches only those fields where special requirements justify a higher cost. However, there are numerous operations where secondary connections are more economical by welding.

In riveted construction there is a trend toward use of special processed rivets made from selected quality steel pickled after forging and centerless ground to a plus or minus 0.002-inch tolerance, declares Pierre Champion, vice president, Champion Rivet Co., Cleveland. Hot pressed into reamed holes, these rivets give a perfect clean metal contact preventing caustic embrittlement.

There is a larger use of cold pressed rivets for electric heating;



however, these are not recommended for pressure work. Likewise, demand for cold made and annealed rivets for driving with minimum pressure is marked, advises Mr. Champion. A new application in the last year is stainless steel rivets for hull bottoms of ocean vessels.

If times were normal, Mr. Champion states, rivet demand would be three times that of 1910, in spite of the fact that lighter structurals require fewer rivets. Years ago rivets represented 7 per cent of total structure, today a scant 3 per cent.

Steelmaking Capacity Added in 1931

Unparalleled in Past 13 Years

STEELMAKING facilities completed during 1931 outdistanced every annual basic open-hearth building program undertaken in this country in the past 13 years. Not since 1918 has the number of basic furnaces added to the national complement exceeded 30 units. But during the year just closed 34 basic furnaces, with more than half located in the Chicago district, were made ready for their initial melting campaign. Back in 1918 the number of basic open hearths laid down totaled 39; intermediate years recorded from 7 to 26 furnaces completed annually.

Expansion in finishing mill capacity authorized in 1929 and 1930 dictated an increase in steelmaking facilities. In the Chicago district where new structural, alloy bar and continuous plate mills were built, the existing complement of steelmaking furnaces no longer was adequate to meet additional finishing mill requirements. And so in this district alone 23 modern open hearths were completed. Expenditures also were made for modernizing existing finishing mill equipment elsewhere in this country and the completed units bring many mechanical improvements to the forefront.

Will Deliever 140-Foot Lengths

What is claimed to be the heaviest continuous plate mill in the world was built in the Chicago district. The total length of the mill from the soaking pits to the finishing end is 2100 feet. The design of the unit affords the output of plates up to 92 inches wide, in maximum lengths of 140 feet and a delivery speed of 350 to 700 feet a minute. The gear drive for the roughing mill includes two gears each 21 feet 8 inches diameter with teeth 6 feet across the face.

The layout is such that plates can be rolled either in one heat from the ingot or reheated slabs. Leaving the slabbing mill the piece passes through a stand of scale-breaking rolls three stands of 2-high roughing rolls, two stands of vertical edging rolls and finally six stands of 4-high finishing rolls of the roller bearing type. After the final finishing pass the plate is roller leveled, then conveyed to a turnover device where it is inspected on both sides and finally is passed to the shears. The entire installation is controlled electrically including the adjustment of the rolls and the operation of the side guards.

Modernization of equipment also has flourished in the sheet and tin making industries where 26 additional hot mills have been equipped with mechanical feeders and catchers. New features have been incorporated in the design of the tables to facilitate delivering the product in alignment and to eliminate certain inconveniences associated with the location of the drive. The new tables are symmetrical about the center line of the mill and permit the operator to work on either side without interfering with the doubling operation. The tilt point of the table has been located at the end to provide the proper angle of delivery over the top roll. In order to have the mills more accessible and to improve their general appearance, the return conveying unit has been placed in a plane below the floor level.

Records of one mill equipped with the improved type of tables disclose outputs as high as 34 tons of 27-gage stock, 28 inches wide, in 8 hours operation, the steel being heated twice, runover through the mill, reheated and finished on the same mill. With one continuous furnace serving two stands of roughing rolls, the production of breakdown sheets averages 40 tons in an 8-hour turn.

The push bench mill made its bow to the American seamless tubemaking industry during the year just closed. In the production of tubes by this method a heated billet is formed under a hydraulic press into a thick-walled thimble. The latter positioned on the end of a mandrel is pushed by a rack and pinion through a series of stationary ring dies which reduce the wall thickness and elongate the piece into a closed-end tube. After removing the mandrel, the closed end is sawed off and the tube is subjected to the usual finishing operations. The 1500-horsepower General Electric reversing motor for actuating the push bench starts and accelerates the ram, forces it through the dies at a predetermined speed, stops, reverses and returns the ram to its starting position at a high rate of speed. The speed of the strokes can be adjusted over a wide range. The controls prevent the ram from overrunning in either direction.

Provides Automatic Control

Many applications of photoelectric and thyratron tubes were made in the steel industry last year. In one plant the operation of a pack furnace and conveyor automatically is controlled by the former type tube. The packs in transit through the furnace intercept a beam of light which actuates the photoelectric relay and stops the conveyor before the sheet strikes the discharge door. The same type relay is utilized to control a shear. Flag switches on automatic catcher tables for sheet mills also are operated by

BLAST FURNACES DISMANTLED IN 1931

Company	Name of Stack
Bethlehem Steel Co., Johnstown, Pa.	"B"
Bethlehem Steel Co., Lackawanna, N. Y.	"C" and "H"
Carnegie Steel Co., Farrell, Pa.	No. 1
Sloss-Sheffield Steel & Iron Co., Gadsen, Ala.	Nos. 9 and 10
Sloss-Sheffield Steel & Iron Co., Sheffield, Ala.	Nos. 5 and 6
Talladego Furnace Properties Co., Talladego, Ala.	Talladego
Warren Foundry & Pipe Corp., Catasauqua, Pa.	Crane
Total	10

Table I

Recapitulation

	Completed 1931	Building 1931
By-Product coke ovens	68	138
Stacks remodeled	6	3
Open-hearth furnaces	34	0
Rolling Mills:		
Bar	2	0
Beam	1	0
Billet	1	0
Blooming	3	0
Merchant	2	0
Plate	1	0
Plate, continuous	2	0
Plate-strip	1	2
Plug	1	0
Rod	2	0
Strip, Steckel cold	2	0
Strip, 2-high cold	1	2
Strip, 2-high hot	0	1
Strip, 4-high cold	9	14
Tin, hot	2	0
Tube, electric weld	1	1
Tube, push bench	0	1
Tube, seamless	1	0
Universal	1	0
Total	33	21

the photoelectric tube. The sheet passing between the rolls actuates the tubes which in turn control the lifting motions of the conveyor. Several installations of thyratron tubes also were made last year for controlling the reels which coil the wire following the drawing operation. The same arrangement is being employed to control the speed of strip steel in transit through a continuous pickling machine.

The thrustor, an electrohydraulic device for obtaining a straight-line motion, was installed by many plants for operating shear stops, tilting and lifting tables, skip hoist brakes and furnace doors. Six units, each designed for a 4000-pound thrust through an 18-inch stroke, are being installed in a plant in the Pittsburgh district for operating the doors of a billet reheating furnace. Valves operated by the thrustor also were installed for automatically controlling the high-pressure water used in hot strip and other type mills for descaling the steel in the process of rolling.

Anneals Strip Electrically

Two installations of electric furnaces for bright annealing coiled strip steel were placed in operation during the year just closed. Each furnace consists of a bell-type heating chamber and several bases or cars upon which the coiler stock is stacked. An inner hood or cover of heat-resisting alloy is placed over the coils and serves to exclude air both during the heating period and while the stock is being cooled. An atmosphere of illuminating gas is maintained under the hoods.

Results of operation have indicated the superiority of this type furnace for annealing cold rolled strip. The advantages include a large saving in time required for annealing, a saving in floor space and handling labor and an improvement in the uniformity of annealing and surface condition. The energy requirement is approximately 175 kilowatt hours per ton of steel treated.

One installation is used almost exclusively for annealing high-carbon strip. To avoid decarburization unusual precautions have been necessary in the past in carrying out the anneal. With the proper atmosphere maintained beneath the hoods in the electric furnace, it has been found practical to anneal this material to the correct temper without decarburization, merely by accurately controlling the temperature, time cycle and atmosphere.

A new type furnace for annealing sheets has been built in which a load of material can be cooled in the furnace in a comparatively short time. The new unit is lined with light-weight refractory brick so that the heat storage in the furnace walls is comparatively small, and employs a circulating system for the furnace atmosphere, with an external cooler by means of which the heat may be extracted from and charged into the compartment at a comparatively high rate.

Gas Is Circulated

The cooling system consists of a finned tubular-type surface cooler, through which water flows; the necessary duct and damper system, and, a motor-driven blower which circulates the gas from the compartment through the cooler and back to the furnace. The cooling rate is controlled by adjusting the speed of the blower, or the valves in the duct system. The use of hydrogen as an atmosphere increases the effectiveness of the system due to the high specific heat of this gas. A load can be cooled in this furnace in about one-half the time required when the stack of sheets is set in an open room under a hood.

Two continuous plate-strip mills were installed in Alabama last year, one by the Gulf States Steel Co. and the other by the Tennessee Coal, Iron & Railroad Co. At the opening of this year two additional mills of this type for supplying rough-down sheets to conventional-type sheet mills, were under construction. Otis Steel Co., Cleveland, is laying down a 72-inch hot plate-strip unit which will be served by what is claimed to be the widest 4-high cold mills so far employed. The cold mills, including two stands of 4-high 72-inch rolls,

Equipment Completed and Building in 1931

Table II

Open Hearths Completed in 1931

Company	Number of furnaces	Rated capacity, tons	Annual capacity, tons
Bethlehem Steel Co., Sparrows Point, Md.	6	150	514,200
Ford Motor Co., Dearborn, Mich.	1	400	123,000
Illinois Steel Co., Gary, Ind.	7	150	599,900
Illinois Steel Co., S. Chicago, Ill.	14	150	1,199,800
National Tube Co., McKeesport, Pa.	3	250	369,000
Tennessee Coal, Iron & R. R. Co., Fairfield, Ala.	1	150	123,000
Wisconsin Steel Co., S. Chicago, Ill.	2	100	140,000
Total	34		3,068,900

Table III

Stacks Remodeled in 1931

Company	Number or name
Bethlehem Steel Co., Lackawanna, N. Y.	*"G"
Carnegie Steel Co., Mingo Junction, O.	No. 2
Carnegie Steel Co., Rankin, Pa.	No. 2
Colorado Fuel & Iron Co., Pueblo, Colo.	"B"
Interlake Iron Corp., Chicago	No. 1
Wheeling Steel Corp., Portsmouth, O.	No. 1
Total	6

*Replacement; 1000 tons or more daily capacity

Table IV

Stacks Being Remodeled Dec. 31, 1931

Company	Number or name
Bethlehem Steel Co., Sparrows Point, Md.	*"D"
Ford Motor Co., Dearborn, Mich.	**Henry
Republic Steel Corp., Youngstown, O.	No. 2
Total	3

*Replacement; 1000 tons or more daily capacity.
**Contemplated.

Table V

By-Product Ovens Completed in 1931

Company	No. of ovens	Type of ovens	Est. annual coking capacity, tons
Consolidated Gas Co., Hunts Point, N. Y.	37	K-B	233,100
Hudson Valley Fuel Corp., Troy, N. Y.	31	K-B	195,300
Total	68		428,400

Table VI

Ovens Building Dec. 31, 1931

Company	No. of ovens	Type of ovens	Est. annual coking capacity, tons
Illinois Steel Co., Gary, Ind.	138	K-B	1,021,200

automatically will slow down to a predetermined slow speed for threading the strip through the rolls, and then speed up to the normal operating rate. The 24-inch sheet bar mill of the company now is being dismantled inasmuch as the 72-inch hot mill will supply roughdowns to the company's 2-high sheet mills.

Adds Wide Strip Mill

Inland Steel Co., Indiana Harbor, Ind., also is installing a 76-inch plate-strip mill which is designed to hot roll stock wider than any other unit of this type thus far built in this country.

A building extension, 60 x 50 feet, was added to an existing warehouse at the Weirton, W. Va., tin mills of the Weirton Steel Co. and the entire floor space set aside for a lacquer department for the coating and storing of black and tin plate. Two ovens, fired with coke oven gas, one hump type for crystalline work and the other a straightway type, as well as two lacquer coating machines were installed. A vacuum cleaning system for cleaning the building also was added and means provided for taking in filtered air from the outside and for keeping the building tight against the infiltration of uncleaned air. The 12-pass continuous roughing and looping finishing train of the 10-inch hot strip mill was rearranged for rolling rounds and squares from ⅜-inch to 1⅜ inches, angles from 1 x 1-inch to 2 x 2½ inches inclusive and concrete bars in a range similar to that mentioned for rounds and squares.

Last year there was placed in operation at a plant in the Chicago district the first installation in this country of motor-driven centrifugal compressors for furnishing air to bessemer converters. Three units, each capable of delivering 31,700 cubic feet of air per minute at 26.8 pounds per square inch, are driven through separate speed increasing gear by a 3600-horsepower motor.

Each compressor ordinarily supplies air to a single converter, but the piping is arranged so that any blower may be connected to any vessel. The control is centered in the pulpit where meters are located on a bench to indicate the air pressure, air volume and speed of each blower. The operators start or stop the units, or increase or decrease their speed to meet changing requirements during each blow.

Melting facilities at the Rouge plant of the Ford Motor Co., Dearborn, Mich., has been increased by the installation of a 400-ton tilting open hearth. Instead of crushing the chassis of old automobiles and shearing the wreckage to charging door sizes, the chassis will be compressed into compact bales at the rate of one a minute. The resultant scrap will be remelted in the new 400-ton furnace and the molten metal transferred to any of the nine 100-ton open hearths in the shop.

Miscellaneous improvements at the open-hearth shop of the Youngstown Sheet & Tube Co., Campbell, O., include the installations of an ingot jarring machine for making sound ingots. The company also added the necessary equipment for relining the re-usable type hot tops and installed temperature reversing control equipment on several of its open hearths and carbometer apparatus for determining the carbon content.

Postpone Decision On Ore Rate Rise

WASHINGTON — No provision for obviating two charges on iron ore was included in the master tariff filed by the railroads with the interstate commerce commission and accepted by the latter, making increased freight rates effective Jan. 4.

It is understood that the roads have agreed there will be only one advance on iron ore, and that shall apply to the highest factors, but with the lake shipping season not opening until late March or April more pressing matters will be decided first.

The new rates add 6 cents a net ton to iron ore, coal, mill cinder and scale, and slag; 12 cents a net ton on pig iron and scrap; 2 cents per 100 pounds on finished iron and steel and less-carload shipments. The increases expire March 31, 1933, or earlier if business conditions improve sufficiently.

A conference on the Chicago switching rate case, scheduled for Jan. 7, has been postponed. These rates were recently advanced ½ to 1 cent on one, two and three line hauls. Formal hearing of objection is set for Jan. 25 at Chicago.

J. D. Maxwell, superintendent of the Tungsten Production Co. Inc., at its Nightingale plant near Lovelock, Nev., will renew development work and if results justify it its mill of 200 tons capacity will be doubled.

Rolling Mills Completed or Building in 1931

Table VII

Rolling Mills Completed in 1931

Company	No. Mills		Type mills
Alloy Metal Wire Co. Inc., Moore, Pa.	1		4-high cold strip
American Steel & Wire Co., Donora, Pa.	2		rod
American Steel & Wire Co., Donora, Pa.	1	24″	billet
American Steel & Wire Co., Cleveland	4	26″	4-high cold strip
American Steel & Wire Co., Cleveland	4	16″	4-high cold strip
American Steel & Wire Co., Cleveland	1	7½″	Steckel strip
American Steel & Wire Co., Worcester, Mass.	1	7½″	Steckel strip
Bethlehem Steel Co., Sparrows Point, Md.	1	40″	universal plate
Bethlehem Steel Co., Sparrows Point, Md.	1		
Carnegie Steel Co., McDonald, O.	1	10″	merchant
Granite City Steel Co., Granite City, Ill.	2	28″	hot tin
Great Lakes Steel Corp., Ecorse, Mich.	1	10″	merchant
Gulf States Steel Co., Alabama City, Ala.	1		plate-strip
Illinois Steel Co., Gary, Ind.	1	44″	blooming
Illinois Steel Co., S. Chicago, Ill.	1	44″	blooming
Illinois Steel Co., S. Chicago, Ill.	1		beam
Illinois Steel Co., S. Chicago, Ill.	1	96″	cont. plate
Illinois Steel Co., S. Chicago, Ill.	1	10″	alloy bar
Jones & Laughlin Steel Corp., Pittsburgh	*1		merchant
National Tube Co., Gary, Ind.	1		seamless tube
Pittsburgh Crucible Steel Co., Midland, Pa.	1		blooming
St. Louis Screw & Bolt Co., St. Louis	1	10″	bar
Tennessee Coal, Iron & R. R. Co., Fairfield, Ala.	1		plate-strip
Wallingford Steel Co., Wallingford, Conn.	1	16″	cold strip
Youngstown Sheet & Tube Co., Youngstown, O.	1		elec. weld tube
Youngstown Sheet & Tube Co., Youngstown, O.	1		plug
Total	33		

*Replacement.

Table VIII

Rolling Mills Building Dec. 31, 1931

Company	No. mills		Type mills
American Sheet & Tin Plate Co., Gary, Ind.	1		4-high cold strip
Heppenstall Co., Pittsburgh	1	10″	hot strip
Heppenstall Co., Pittsburgh	2	8″	cold strip
Inland Steel Co., Indiana Harbor, Ind.	1	76″	hot plate-strip
Inland Steel Co., Indiana Harbor, Ind.	7	54″	4-high cold strip
Inland Steel Co., Indiana Harbor, Ind.	3	42″	4-high cold strip
Jones & Laughlin Steel Corp., Aliquippa, Pa.	1		push-bench tube
Otis Steel Co., Cleveland	1	72″	hot plate-strip
Otis Steel Co., Cleveland	2	72″	4-high cold strip
Republic Steel Corp., Massillon, O.	1		4-high cold strip
Spang Chalfant & Co. Inc., Ambridge, Pa.	1		elec. weld tube
Total	21		

Hesitant Attitude Marks Entry of First Quarter

Steelmakers Taking Measures To Check Downward Price Drift—Operating Rate Recoups Holiday Loss—Fewer Stacks Active Than at Bottom of 1921

IRON and steel markets are emerging from the holiday lull without any measurable clarification in demand or prices. The automotive industry is awaiting the verdict of the January shows; railroads are withholding track material releases pending a decision on wages; building activity is good, considering the season, but pipe business is being deferred by the formulation of municipal budgets and financing for projected long-distance lines.

Steelworks operations have snapped back practically to the level prior to the Christmas shutdown, ranging between 20 and 24 per cent in the week ended Jan. 2, compared with 15-20 per cent in the week ended Dec. 26. A further slight gain is indicated for the week beginning Jan. 4, but rarely have steel producers entered a first quarter with so little tangible business on books. In few instances have consumers anticipated requirements to forestall increases in freight rates effective Jan. 4, though in most cases the burden will fall upon them.

Because prices are unsettled and buyers are disposed to wait, producers are not pressing for contracts. Further weakness has developed in semifinished steel; in galvanized and No. 10 blue annealed sheets; in hot-strip and hot-rolled steel bars; and in pig iron at Buffalo. STEEL'S single price composite, therefore, is down 20 cents to $29.96, and the finished steel composite is off 40 cents to $47.12. However, definite measures to stabilize steel prices now are being undertaken.

Concrete reinforcing bar awards are unusually heavy at 13,600 tons, due to an award of 9000 tons by Minnesota for highway work, to the Minnesota Steel Co. Structural steel awards for the week total 17,100 tons, compared with 45,520 tons a week ago. It now develops the 70,000 boxes of tin plate to be purchased by an American packer for delivery in Argentina may be placed with an American mill. The Erie railroad has definitely inquired for 1932 rail requirements, estimated at 40,000 tons.

Climaxing an unsatisfactory year, an estimate of pig iron production for December places the daily rate at 31,694 gross tons, a decline of 13.7 per cent from 36,727 tons in November. Output of coke pig iron for 1931 totals 18,265,155 tons, contrasted with 31,441,488 tons in 1930. A net loss of 10 stacks leaves only 57 in blast Dec. 31, a smaller number than at the bottom of the depression in 1921.

Comparative Prices of Iron, Steel and Coke

Representative Market Figures for Current Week, Last Month, Three Months and One Year Ago

	Jan. 2, 1932	Dec., 1931	Oct., 1931	Jan., 1931
PIG IRON				
Bessemer, del. Pittsburgh	$17.26	17.51	18.16	18.76
Basic, valley	15.00	15.00	16.50	17.00
Basic, eastern del. eastern Pa.	16.00	16.00	16.25	17.25
No. 2 foundry, del. Pittsburgh	17.26	17.51	18.16	18.26
No. 2 foundry, Chicago	16.50	16.60	17.20	17.50
*Southern No. 2, Birmingham	12.00	12.00	12.00	14.00
**No. 2X, Virginia furnace	18.00	18.00	18.00	18.25
**No. 2X, Eastern del. Phila.	15.76	16.01	17.26	18.26
Malleable, valley	16.00	16.10	16.90	17.50
Malleable, Chicago	16.50	16.60	17.10	17.50
Lake Superior, charcoal, del. Chi.	20.04	20.79	25.04	27.04
Gray forge, del. Pittsburgh	16.63	16.88	17.53	17.63
Ferromanganese, del. Pittsburgh	79.79	84.79	89.79	89.79

*1.75 to 2.25 silicon. For local delivery, Northern shipments based on $11, Birmingham. **2.25 to 2.75 silicon.

COKE				
Connellsville furnace, ovens	2.25	2.30	2.40	2.50
Connellsville foundry, ovens	3.25	3.25	3.25	3.30
SEMIFINISHED MATERIAL				
Sheet bars, open-hearth, Youngs.	27.00	28.00	29.00	30.00
Sheet bars, open-hearth, Pitts.	28.00	28.00	29.00	30.00
Billets, open-hearth, Pittsburgh	28.00	29.00	29.00	30.00
Wire rods, Pittsburgh	37.00	35.00	35.00	35.00

	Jan. 2, 1932	Dec., 1931	Oct., 1931	Jan., 1931
FINISHED MATERIAL				
Steel bars, Pittsburgh	1.50	1.60	1.60	1.65
Steel bars, Chicago	1.60	1.60	1.70	1.70
Steel bars, Philadelphia	1.84	1.89	1.89	1.94
Iron bars, Chicago	1.60	1.60	1.70	1.70
Shapes, Pittsburgh	1.50	1.50	1.60	1.60
Shapes, Philadelphia	1.69½	1.69½	1.76	1.81
Shapes, Chicago	1.60	1.60	1.70	1.70
Tank plates, Pittsburgh	1.50	1.50	1.60	1.65
Tank plates, Philadelphia	1.73½	1.73½	1.80½	1.81½
Tank plates, Chicago	1.60	1.60	1.70	1.70
Sheets, No. 10 blue anneal., Pitts.	1.75	1.85	1.85	2.05
†Sheets, No. 24, hot, ann., Pitts.	2.25	2.40	2.40	2.35
Sheets, No. 24, galvan., Pitts.	2.80	2.90	2.90	2.90
Sheets, No. 10 blue anneal., Chi.	2.00	2.00	2.00	2.50
†Sheets, No. 24, hot, ann., Chi.	2.45	2.55	2.55	2.20
Sheets, No. 24 galvan., Chi.	3.05	3.05	3.05	3.05
Plain wire, Pittsburgh	2.20	2.20	2.20	2.20
Wire nails, Pittsburgh	1.95	1.95	1.90	1.90
Tin plate, per base box, Pitts.	4.75	4.75	4.75	5.00

†Comparisons are with old classification No. 24 black sheets.

SCRAP				
Heavy melting steel, Pitts.	$10.25	10.25	10.45	13.00
Heavy melting steel, eastern Pa.	7.50	7.65	8.20	10.50
Heavy melting steel, Chicago	7.50	7.50	7.75	10.00
No. 1 wrought, eastern Pa.	9.50	9.50	9.50	13.25
No. 1 wrought, Chicago	7.25	7.40	8.00	9.50
Rails for rolling, Chicago	10.25	10.00	10.50	13.00

Current Finished Steel Prices

Delivered prices subject to freight surcharge beginning Jan. 4. Prices in cents per pound unless otherwise stated

Steel Sheets

HOT ROLLED No. 10

Pittsburgh, base	1.65c to 1.70c
Gary, Ind. Harbor, base	1.75c to 1.80c
Chicago, del.	1.80c to 1.85c
Philadelphia, del.	1.94c to 1.99c
Birmingham, base	1.80c to 1.85c

BLUE ANNEALED NO. 9-10

Pittsburgh, base	1.75c to 1.85c
Chicago, district mills	1.95c
Chicago, delivered	2.00c
Philadelphia, del.	2.14c
St. Louis, delivered	2.20½c
Birmingham	2.00c
San Francisco c.i.f.	2.33c

***HOT ROLLED ANNEALED NO. 24**

Pittsburgh, base	2.25c to 2.40c
Gary, Ind. Harbor, base	2.40c to 2.50c
Chicago, del.	2.45c to 2.55c
Philadelphia, del.	2.59c to 2.69c
Birmingham, base	2.45c to 2.55c
St. Louis, del.	2.75½c
San Francisco, c.i.f.	2.88c

GALVANIZED NO. 24

Pittsburgh, base	2.80c to 2.90c
Gary, Ind. Harbor, base	3.00c
Chicago, del.	3.05c
Philadelphia, base	3.19c
Birmingham, base	3.05c
St. Louis, del.	3.25½c
San Francisco, c.i.f.	3.38c

***AUTOMOBILE NO. 20**

Pittsburgh, base	2.90c to 3.00c

FURNITURE

Pitts., No. 10 heavy	2.65c
Pitts., No. 20 light	3.25c

TIN MILL BLACK NO. 28

Pittsburgh, base	2.55c to 2.65c
Gary base	2.65c to 2.75c
St. Louis, del.	3.00½c

***HEAVY COLD ROLLED NO. 10**

Pittsburgh base	2.25c to 2.35c
Gary, Ind. Harbor, base	2.35c to 2.45c
Chicago, del.	2.40c to 2.50c
Philadelphia, del.	2.54c to 2.64c
St. Louis, del.	2.70½c

***COLD ROLLED NO. 20**

Pittsburgh, base	2.85c to 2.95c
Gary, Ind. Harbor, base	2.95c to 3.05c
Chicago, del.	3.00c to 3.10c
Philadelphia, del.	3.14c to 3.24c
St. Louis, del.	3.30½c

*Lower prices have been applied on large tonnages of special sizes.

Tin and Terne Plate

Prices per 100-pound box Pittsburgh

Tin plate, coke base	$4.75

Gary, Ind., base 10 cents higher

Long ternes, 24, unassorted, 3.00c to 3.10c

Wire Products

(Prices apply on straight carloads. Mixed and joint carloads take 10 cents higher price; pool carloads 25-cent advance; less carloads 40-cent advance.)

F.o.b. mills, 100 lb. keg

Standard wire nails	$1.95
Cement coated nails	1.95
Galvanized nails	3.95

(Per pound)

Polished staples	2.50c
Galvanized staples	2.75c
Barbed wire, gal.	2.60c
Annealed fence wire	2.35c
Galvanized wire	2.80c
Woven wire fencing, (9-11 ga.)	$55.00
(12½ ga. and lighter)	$60.00

(To Manufacturing Trade)

Plain wire, 6-9 gage	2.20c
Spring wire	3.20c

Joliet, DeKalb, Waukegan, Ill., Anderson, Ind. Chicago, $1 over Pitts-Cleve.; Duluth and Worcester, Mass., $2 higher; Fairfield, Ala., $3 higher.

Steel Plates

Pittsburgh, base	1.50c to 1.60c
Philadelphia, del.	1.68½c to 1.78½c
New York, delivered	1.78c to 1.88c
Boston, delivered	1.95c
Chicago, base	1.60c to 1.70c
Cleveland, del.	1.68½c to 1.78½c
Lackawanna, N. Y., base	1.60c to 1.70c
Birmingham, base	1.75c
Coatesville, Pa., base	1.65c to 1.70c
Pacific Coast, c.i.f.	1.80c to 1.85c
St. Louis, del.	1.95½c

Structural Shapes

Pittsburgh, base	1.50c to 1.60c
Philadelphia, del.	1.66½c to 1.76½c
New York, del.	1.75¼c to 1.80¼c
Boston, del.	1.88½c to 1.93½c
Chicago, base	1.60c to 1.70c
Cleveland, delivered	1.68½c to 1.78½c
Lackawanna, N. Y., base	1.60c to 1.70c
Birmingham, base	1.75c
Pacific Coast, c.i.f.	2.05c
Do, wide flange	2.15c

Bars

SOFT STEEL

Pittsburgh, base	1.50c to 1.60c
Chicago, base	1.60c to 1.65c
Birmingham, base	1.70c to 1.75c
Lackawanna, N. Y., base	1.60c to 1.70c
Pacific coast, c.i.f.	2.05c
Cleveland, base, local del.	1.60c to 1.65c
Cleveland base, out. del.	1.60c to 1.65c
Philadelphia, del.	1.79c to 1.89c
New York, del.	1.83c to 1.93c
Boston, del.	1.95c to 2.00c
Pittsburgh, cold finish	1.85c
Pittsburgh, forg. qual.	1.90c

RAIL STEEL

Chicago Heights	1.50c to 1.60c
Eastern mills	1.30c
Pittsburgh	1.30c to 1.35c

IRON

Chicago, base	1.60c to 1.65c
New York, delivered	1.88c to 1.98c
Philadelphia, delivered	1.84c to 1.94c
Pittsburgh, refined	2.70c to 4.20c

REINFORCING

Pitts., billet cut lengths	1.75c
Stock lengths, mill	1.60c
Chi., billet	1.75c to 2.00c
Chi., rail steel	1.55c to 1.80c
Chi., rail steel, bridges and culvert	1.40c to 1.50c
Philadelphia, cut lengths	2.04c
Cleveland, cut lengths	1.75c

Cold Finished Bars, Shafting

Base Pittsburgh, Chicago, Buffalo and Cleveland	2.00c
Shafting, turned and ground, Pittsburgh, Cumberland, Md.	2.35c to 2.80c

Corrosion, Heat Resist. Alloys

Base, Pittsburgh

18 per cent chrome, 8 per cent nickel Sheets, 35c; plates, 31c; bars, 28c.

	A	B	C	D
Bars	19c	20.5c	23c	28c
Plates	21c	22.5c	25c	30c
Sheets	23c	24.5c	27c	32c
Hot Strip	19c	20.5c	23c	28c
Cold strip	25c	26.5c	29c	34c

Carbon 0.12 and under; no nickel. A has chrome 15% and under. B over 15/18% inc., C over 18/23% inc., D over 23/30%.

Wrought Washers

Carloads, Pitts. dist.	$6.50 to 6.75 off
Carloads, Chicago dist.	7.00 to 7.50 off

Alloy Steel

Hot Rolled—F.o.b. Mills

Alloy Quality Bars, 2.65c, mill

S.A.E.	Alloy Diff.	4600 .20 to .30 Mo.
2000	0.25	1.25-1.75 Ni. 1.05
2100	0.55	5100 .80 - 1.10 Cr. 0.45
2300	1.50	51.00 Cr.
2500	2.25	spring 0.20
3100	0.55	6100 bars 1.20
3200	1.35	6100 Spring 0.95
3300	3.80	Cr., Ni., Van. 1.50
3400	3.20	Carbon Van... 0.95
4100 .15 to .25 Mo.	0.50	9250 (flats) 0.25 9250 (rds.,sq.) 0.50

Strip, Hoops Bands

Hot strip, to 6-in., Pitts.	1.55c to 1.60c
Do, 6 1/16 to 24-in., Pitts.	1.45c to 1.50c
Hot strip to 6 in. Chi.	1.65c to 1.70c
Do, 6 1/16 to 24 in.	1.55c to 1.60c
Cooperage hoop, Pitts.	1.70c to 1.80c
Do., Chicago	1.85c to 1.95c
Cold-roll. strip, Pitts., Cleve.	2.00c to 2.15c
Worcester, 3 tons, over	2.20c

Rails, Track Material

Standard rails, mill	$43.00
Relay rails, Pitts., 20 to 45 lbs.	$22.00 to $26.00
50 to 75	20.00 to 24.00
80 to 100	24.00 to 27.00
Light rails, 25-45, mills	$34.00
Light rails, Chicago	$36.00
Angle bars, mills	2.75c
Spikes, railroad, mills	2.60c
Spikes, railroad, 7/16-in. and smaller, Pitts.	2.60c
Spikes, boat, barge, Pitts.	2.90c
Track bolts, Pitts., steam	3.50c
Do, standard, jobbers	73 off list
Track bolts, Chicago	3.50c
Tie plate, mills	$37.00

Bolts and Nuts

Pittsburgh, Cleveland, Birmingham, Chi. Discounts to legitimate jobbing or large consuming trade for full-case lots apply to May 10, 1930, lists.

CARRIAGE BOLTS

All sizes, cut thread 73, 10 and 10 off

Rolled thread ⅜ x 6 and smaller take 10 per cent lower list.

Eagle list 73, 10 and 10 off

MACHINE BOLTS

All sizes, cut thread, lag screws, plow bolts, Nos. 1-2-3-7 heads, tap bolts, blank bolts, stud bolts without nuts 73, 10 and 10 off

Tire bolts 60, 10 and 10 off

Stove bolts, 80-25-10 off in pkgs.; 80 25-10-2½ off in bulk.

Rolled thread machine bolts, ⅜ x 6 and smaller take 10 per cent lower list.

NUTS

Semifinished 73, 10 and 10 off

HEXAGON CAP SCREWS

Milled 80-10-10-5 off

Upset 1 in. diam. and smaller 85-10 off

SQUARE HEAD SET SCREWS

Milled 80-5 off

Upset 1 in. and smaller 80-10-5 off

Upset, larger than 1 in. 80-5 off

Cut Nails, Chain, Piling

Cut nails, c.l. Pittsburgh 2.50c

Do. less carloads, 5 kegs or over 2.75c; less than 5 kegs, 2.90c.

Chain, BB, BBB, 9/16-1½ in. 33 1/3 off

Sheet piling, Pitts. 1.90c

Rivets

Struc., c.l., Pitts.-Cleve.	2.25c
Struc., c.l., Chicago	2.35c
7/16-in. smaller, Pitts.	70, 10 and 5 off
Chicago, Cleve.	70, 10 and 5 off

Sheets

Prices More Unsettled, Wider Spreads Developing in Some Grades—Sales Still Moderate

SHEET PRICES, PAGE 175

Pittsburgh—Wide spreads have developed in some sheet prices. Hot-rolled annealed now range from 2.25c to 2.40c. Galvanized are 2.90c, although 2.80c prevails in some districts. Blue annealed generally are 1.85c, with weakness noted in some gages. Specifications are fairly steady but light, with few indications of any marked improvement in January.

New York—Except for No. 10 blue annealed and galvanized, a spread of $1 to $2 a ton now prevails on sheets. Concessions on galvanized are more in evidence.

Philadelphia—Sheet buying is quiet with prices unsettled. Quotations on galvanized and blue annealed appear the steadiest.

Youngstown, O.—Makers of stampings continue fairly busy and manufacturers of refrigerators are taking shipments of full-finished materials, while producers of enameled-ware are among the best consumers. Demand for automotive sheets continues to lag. Mills expect some improvement in orders for railroad car repairs.

Cleveland—The 1100 tons of license plate stock which Republic Steel Corp. took for Ohio will be shipped at the rate of 150 tons a month from February to September. Inquiry last week was the lightest of any week in 1931. Fisher Body Co. here made a fill-in buy of sheets. Prices, under the influence of seconds, continue weak.

Cincinnati—Mill schedules will be returned this week to the average of the last two months, with prospects for a moderate gain in January. Recent sales of No. 10 furniture sheets have been at 2.65c, Pittsburgh, and No. 20 at 3.25c.

Chicago—Downward revisions of sheet prices aggregating $1 to $3 have quieted the scattered contract negotiations. An accumulation of numerous small orders for quick shipment are noted. Award of 1500 tons of sheets for the Chicago postoffice has been postponed until some time this week. Bids are being tabulated for 300 tons for Kansas license plates.

Tin Plate Order Likely To Go To American Mills

Tin Plate Prices, Page 175

New York—Seventy thousand base boxes of tin plate for shipment to Argentina, for the account of an American packer, will be placed with American producers, according to present indications.

Pittsburgh—January specifications are expected to be light, as a result of the carryover of some tonnage. Mill operations rebounded from the Christmas week rate to about 40 per cent. The market is steady at $4.75 per base box, Pittsburgh.

Cold-Finished Demand Lacks Automotive Buying

Cold Finished Prices, Page 175

Pittsburgh—Lack of business from Ford Motor Co. is affecting activity adversely. A few first quarter contracts, in a slower volume than usual, have been entered at 2.00c, Pittsburgh. Shipments to the general consuming trade have been steady as have been incoming specifications. The general automotive outlook points to only moderate January improvement.

Cleveland—Shipments of cold-finished steel bars were made up of only an occasional lot last week, curtailment of mill releases being in large part actuated by consumer plant inventories. The market is 2.00c.

Railroads

New York Central Rail Inquiry Possible by February — Car Buying Nil—Erie Rails Out

TRACK MATERIAL PRICES, PAGE 175

New York—While the New York Central is canvassing its various lines to ascertain 1932 rail requirements, at the earliest no inquiry will be out until February. Demand for rolling stock continues at low ebb.

Philadelphia — Pennsylvania railroad opens bids Jan. 12 on structural material and steel pipe, the latter identified as contract No. 2.

Pittsburgh—Railroads continue to defer steel purchases. No new inquiry is appearing and a number of recent inquiries for first-quarter needs remain to be closed.

Cleveland—Erie railroad has its inquiry for 1932 rail requirements out involving an unstated tonnage, but generally believed to be about 40,000 tons.

Chicago—Only car equipment inquiries pending are 300 underframes for the Western Fruit Express and 150 hoppers for the Northern Pacific. Though bids have been tabulated, no action may be taken until the wage question is determined. Rail mill operations are at 20 per cent.

Rail Orders Pending

Erie railroad, 1932 requirements, unstated tonnage but believed to be approximately 40,000 tons.

Composite Market Averages

	Jan. 2	Dec. 26	One Month Ago (Dec., 1931)	Three Months Ago (Oct., 1931)	One Year Ago (Jan., 1931)	Ten Years Ago (Jan., 1922)
Iron and Steel Composite	$29.96	$30.16	$30.32	$30.74	$31.71	$33.35
Finished Steel Composite	47.12	47.52	47.74	48.22	49.30	50.54
Steelworks Scrap Composite	8.12	8.12	8.16	8.50	10.49	11.31

Iron and Steel Composite:—Pig iron, billets, slabs, sheet bars, wire rods, pipe, tin plate, nails, sheets, plates, shapes, bars. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Melting steel, compressed sheets.

Structural Shapes

Chicago Bridge, 4100 Tons, Placed—Awards Are Heavy Considering Season—Much Pending Work Carried Into 1932—Prices Nominal in Many Instances

STRUCTURAL SHAPE PRICES, PAGE 175

New York—Bids close Jan. 11 on steel deckwork, route 25 viaduct, New Jersey. One alternate calls for 7500 tons, other alternates are not so heavy. Old pending tonnage, which is fairly heavy is largely state work. Bids go in an Washington and Albany. N. Y., on several large jobs this and next week.

Chicago—Prices are not clearly defined, but 1.60c, mill, predominates on present shipments. Inquiries total 8000 tons, half of which is public work. Awards last week were 7100 tons.

Contracts Placed

4100 tons, Manheim road bridge, Chicago, to Wisconsin Bridge & Iron Co., North Milwaukee, Wis., through Minder Construction Co.

2300 tons, subway, section 2, bed of Morris canal, Washington street, to Raymond plaza west, Newark, N. J., to McClintic-Marshall Corp., Bethlehem, Pa.; J. Rich Streets Inc., contractor.

1200 tons, state highway bridges, Minnesota, to various fabricators.

1200 tons, miscellaneous bridge work in Missouri, to several unstated fabricators.

1000 tons, bascule bridge, Cass street, Joliet, Ill., for Illinois waterways division, to Independent Bridge Co., Pittsburgh, previously reported as Chicago bridge.

720 tons, wharf, Poland street, Port of New Orleans, to American Bridge Co., Pittsburgh.

610 tons, six-story apartment with subbasements, Riverside drive and 155th street, New York, to Easton Structural Steel Co., Easton, Pa.; E. S. Brandt, builder.

600 tons, miscellaneous highway bridge spans in Illinois, to Illinois Steel Bridge Co., Jacksonville, Ill.

600 tons, pile anchor plates, White City sewage plant, Cleveland, to American Bridge Co., Pittsburgh, through American Construction Co., Cleveland, contractor.

575 tons, exchange building, Portland, Me., for New England Telephone & Telegraph Co., to McClintic-Marshall Corp., Bethlehem, Pa.

536 tons, highway bridge, Shoals, Ind., for Indiana State highway department, to Vincennes Bridge Co., Vincennes, Ind.

450 tons, bridge work, Wisconsin, for Chicago & North Western railroad to American Bridge Co., Pittsburgh.

340 tons, King Bruwaert home, Hinsdale, Ill., to Hansel-Elcock Co., Chicago.

300 tons, beam spans, highway bridges, Georgia, to unstated fabricators.

300 tons, municipal pier shed, Trenton, N. J., to N. A. K. Bugbee Co., Trenton, second low bidder.

250 tons, bridge over Orange avenue, Long Beach, Calif., to Consolidated Steel Corp., Los Angeles.

210 tons, state bridge, Dodgeville, N. Y., to Lackawanna Steel Construction Co., Buffalo; M. R. Ingraham, contractor.

200 tons, bureau of roads bridge, Boise county, Idaho, to unstated, through C. F. Dinsmore, Ogden, Utah, contractor.

200 tons, shapes and bars, city hall and fire station, Big Springs, Tex., to Mosher Steel & Machinery Co., Dallas Tex., and Concrete Engineering Co., Omaha, Nebr.; C. S. Lambie & Co., Amarillo, Tex., contractors.

180 tons, bridge over Ocean avenue, Los

(*Concluded on page* 184)

Awards Compared

	Tons
Awards, week ended Jan.2	**17,107**
Awards, week ended Dec. 26	**45,520**
Awards, week ended Dec. 19	**8,760**
Awards, this week in 1931	**14,635**
Av. weekly awards, 1931....	**34,236**
Av. weekly awards, 1932....	**17,107**
Av. weekly awards, Dec.	**23,286**
Total awards to date, 1931..	**14,635**
Total awards to date, 1932..	**17,107**

Concrete Bars

Minnesota Buys 9000 Tons for 1932 Highway Needs—Prices Firmer at Pittsburgh Mills—New Pending Items Few as Many Jobs Await Closing—Total Awards Gain

REINFORCING BAR PRICES, PAGE 175

New York—Bids go in Jan. 11 on three contracts covering steel deck work for route 25 viaduct, northern New Jersey, nine sections to be included or 926,000 square feet. Last week's lettings were heavier, including both large and small jobs. Prices are steady on ordinary lots at 1.93c.

Chicago—Rail steel bar distributors have increased prices further to a maximum of 1.80c for less-carload, making the range now 1.65c to 1.80c. Billet bar fabricators are quoting a maximum of 2.00c for small lots.

Contracts Placed

9000 tons, highway construction requirements for 1932, Minnesota, to Minnesota Steel Co., Duluth, through Paper, Calmenson & Co., St. Paul.

695 tons, Meadow Brook hospital, Hempstead, N. Y., to Concrete Steel Co., New York.

542 tons highway work, San Mateo and Santa Clara counties, Calif., to unnamed interest.

500 tons, stone crushing plant, Cold Spring, N. Y., to National Bridge Co., Long Island City, N. Y.

385 tons, four buildings and tunnels, Kings Park state hospital, Kings Park, Long Island, N. Y., to Igoe Bros., Newark, N. J.; David L. Benstock Inc., Bay Shore, N. Y., contractor.

381 tons, two bridges, Mendocino county, Calif., over Big Dan and Cedar creeks to Kyle & Co., Fresno, Calif.

362 tons, men's gymnasium, University of California, Berkeley ,Calif., to Pacific Coast Steel Corp., San Francisco.

235 tons, bridge over Orange avenue, Long Beach, Calif., to unnamed interest.

230 tons, hospital, Lima, O., to Hausman Steel Co., Toledo, O., through Charles H. Shook Inc., Dayton, O., contractor. Twenty-one tons structural pending.

220 tons, pier, East river, South street, New York, to Rawlins Steel Co., New York, through J. Rich Steers Inc., New York.

150 tons, three dam control houses, Lockport, Starved Rock and Marseilles, Ill., to Kalman Steel Corp., Bethlehem, Pa.

125 tons, King Bruwaert home, Hinsdale, Ill., to Concrete Engineering Co., Omaha, Nebr.

120 tons, sewer, Fifty-ninth street, west side Manhattan (New York) to Concrete Steel Co., New York; Murphy & Richmond, contractors.

113 tons, two bridges, San Luis Obispo county, Calif., to Pacific Coast Steel Corp., San Francisco.

Awards Compared

	Tons
Awards, week ended Jan. 2	**13,658**
Awards, week ended Dec. 26	**600**
Awards, week ended Dec. 19	**6,072**
Awards, this week, 1931....	**664**
Av. weekly awards, 1931	**6,808**
Av. weekly awards, 1932....	**13,658**
Av. weekly awards, Dec.....	**4,623**
Total awards to date, 1931	**664**
Total awards to date, 1932	**13,658**

Plates

New Business Light — Shipments for Bridge Work Lead at Chicago—Market Price Easy

PLATE PRICES, PAGE 175

Chicago — Plate shipments are chiefly for bridge work. Mills are quoting 1.70c, Chicago, for first quarter, except for extended protection on individual work at $2 less, although 1.60c had been named up to the last day of December.

Philadelphia—A spread of 1.60c to 1.70c, Coatesville, Pa., prevails, with the lower figure applying to the larger quantities. Consumers are contracting slowly.

Pittsburgh—Plate demand is limited to small lots. The 1.60c price is untested, and attractive lots continue to bring concessions.

Cleveland—Demand continues restricted, releases in the past week being the lowest of the year. Mills are making the 1.60c, base, Pittsburgh, price nominal on attractive orders.

Contracts Placed

300 tons, lighthouse tender for inspection boat for United States engineers, Kansas City district, to Howard Shipyards & Dock Co., Jeffersonville, Ind.

100 tons, plates and shapes, tank and foundations, Nansemond ordnance depot, Virginia, to Chicago Bridge & Iron Works, Chicago.

Unstated tonnage, one 50,000-gallon steel water tank, Indian school, Flandreau, S. D., to Chicago Bridge & Iron Works, Chicago.

Unstated tonnage, two steel needle flats, army engineer, Cincinnati, to Midland Barge Co., Midland, Pa.

Contracts Pending

1500 tons, two dredges for United States engineers, St. Louis; bids close Feb. 5, chief army engineer, Washington.

300 tons, two fuel oil barges, army engineer, Cincinnati; McClintic-Marshall Corp., Bethlehem, Pa., low.

210 tons, plates and sheets, partitions, department of agriculture building, Washington; United Metal Products Co., Canton, O., low.

200 tons, tunnel lining for Hoover dam project, Boulder City, Nev.; bids called for.

160 tons, plates and sheets, flooring, partitions, shelving, assay office, New York; Globe Iron Works, New York, low.

Wire Prices Holding but Movement Is Light

Wire Prices, Page 175

Chicago—Specifications and contracts are light. First quarter books have fair manufacturers' wire orders, on which no price change for that period was announced, but are lacking in orders in most of the other products.

Worcester, Mass.—Wire production was low as the year ended but there is no pessimism. Prices remain at 2.30c, base, Worcester, for plain bright wire to dealers.

Trenton, N. J.—Contracts to be closed by the New Jersey state highway commission Jan. 4 included three requiring 3420 linear feet wire rope railing for the route 25 viaduct at Newark, Jersey City and Kearny.

American Cable Co. has been awarded 210,000 feet of steel cable for the navy, Philadelphia, at $6221.50.

Pittsburgh—Shipments of wire and wire products increased moderately during the past week in anticipation of the advance in freight rates, effective Jan. 4, and higher prices adopted for first quarter business. Shipments against old contracts are scheduled for completion Jan. 15.

Cleveland—Several good days increased fence, wire and nail shipments last week to the best of several months. No test has been given $1.95 a keg on nails. Wire is 2.20c base.

Quicksilver Quiet

New York—Quicksilver sales are slow, and prices unchanged at $66.50 to $68, a virgin flask of 76 pounds, in small lots.

Strip Prices Decline $1; December Shipments Gain

Strip Prices, Page 175

Chicago—Recent concessions of $1 a ton in hot-rolled strip steel have become recognized, although first quarter quotations are uncertain. Narrower sizes of hot-rolled are quoted 1.65c to 1.70c, Chicago, while wider hot-rolled is 1.55c to 1.60c. Virtually no cold-rolled contracts for first quarter have been placed in the last ten days. The price now quoted is 2.00c, Pittsburgh-Cleveland.

New York—Strip prices are 1.45c to 1.50c and 1.55c to 1.60c, Pittsburgh, on wide and narrow hot-rolled, respectively. Cold-rolled strip is easy at 2.05c.

Steel for New York license plates, 1800 tons of No. 24 gage, on which Apollo Steel Co. is low, is still pending.

Pittsburgh—Strip incoming business and shipments in December compared favorably with November. The market generally is quoted at a minimum of 1.45c and 1.55c for hot strip and 2.00c for cold-rolled strip.

Youngstown, O.—Some strip specifications are being released by auto partsmakers, but the volume is small.

Cleveland—Some hot-rolled strip mills are making further concessions, 1.45c and 1.55c, Pittsburgh, being noted fairly frequently. Cold-rolled is dull at 2.05c, Cleveland, minimum.

Bars

Prices Easy and Not Fully Clarified for First Quarter—Automotive Orders Less Promising

BAR PRICES, PAGE 175

Chicago—A fair tonnage of bars has been ordered for release in January, but the automotive outlook is less promising than several weeks ago. Inland Steel Co. has announced an advance of $2 to 1.70c, western mill, for first quarter, although 1.60c to 1.65c has not entirely disappeared for that delivery.

New York—Steel bars are offered at 1.50c to 1.60c, Pittsburgh. Common iron bars are holding around 1.60c, Pittsburgh.

Philadelphia—Bar prices are unsettled, with 1.50c to 1.60c, Pittsburgh, the apparent spread. Common iron bars are 1.60c, Pittsburgh.

Pittsburgh—Steel bar business continues light, automotive demands still lagging. The market generally is quoted 1.60c, Pittsburgh, but occasionl lots are reported at less.

Youngstown, O.—A week's accumulation of bar specifications led to the resumption of a number of mills by independents and the leading interest. Makers expect demand will improve in January. Soft steel bars are 1.55c to 1.60c, Pittsburgh.

Cleveland—The local bar base of 1.65c has become somewhat unsettled through the naming of a 1.50c Pittsburgh base by at least one producer and the tendency of the Pittsburgh base for other than extremely small lots to settle to that level.

Raw Material Prices

Delivered prices subject to freight surcharge beginning Jan. 4

Pig Iron

Per Gross Ton

FOUNDRY, NO. 2

Chicago furnace	$16.50
Pittsburgh, dist. fur.	16.50 to 17.00
Pittsburgh, delivered	17.13 to 18.13
Valley furnace	15.00 to 16.00
Cleveland fur., local del.	16.00
Philadelphia, delivered	15.26 to 15.76
Virginia furnace	17.50
Granite City, Ill., fur.	17.50
Buffalo, fur., local del.	16.00
Buff., all-rail, Boston	19.91 to 20.41
Buff., all-rail, Brooklyn	19.15 to 19.90
Buff., all-rail, Newark	17.53 to 18.28
Ala., Bir. fur., local del.	12.00
Alabama, del. Chicago	17.14
Alabama, del. St. L.	15.42
Alabama, del. Cincinnati	14.69 to 15.19
Ala., Phila., dock del.	16.00 to 16.25
Ala., Balt., dock del.	16.00
Alabama, New York dock	16.50
Ala., Boston dock del.	16.50 to 16.75
Tenn., Bir. base, local del.	13.00
Tennessee, del. Cinn.	14.69 to 15.19
Montreal, delivered	23.00 to 23.50
Toronto, delivered	22.10

FOUNDRY, NO. 2X

Buffalo, fur., local del.	16.50
Buff., all-rail, Brooklyn	19.90 to 20.40
Buffalo, all-rail Newark	18.28 to 18.78
Buff., all-rail, Boston	20.91 to 21.41
Virginia furnace	18.00
Eastern, del. Phila.	15.76 to 16.26

FOUNDRY, NO. 1X

Buffalo fur., local del.	17.50
Eastern, del. Phila.	16.26 to 16.76

MALLEABLE

Valley furnace	16.00 to 16.50
Cleveland fur., local del.	16.00
Pittsburgh dis. fur.	16.50 to 17.00
Pittsburgh, delivered	17.13 to 18.13
Chicago, furnace	16.50
Buffalo fur., local del.	16.50
Eastern Penna., delivered	17.76 to 19.91
Granite City, Ill., fur.	17.50
Montreal, delivered	24.00
Toronto, delivered	22.60

BASIC

Pittsburgh, district fur.	15.50 to 16.00
Pittsburgh, delivered	16.13 to 17.13
Eastern Penn., del.	16.00 to 16.50
Buffalo fur., local del.	15.50 to 16.00
Montreal, delivered	23.50
Valley, furnace	15.00

BESSEMER

Valley furnace	16.00 to 16.50
Pittsburgh, delivered	17.13 to 18.13
Pittsburgh, furnace	16.50 to 17.00

LOW PHOS.

Valley fur., standard	27.00
Philadelphia, standard	23.76 to 26.79
Copper-bear., E. Pa. fur.	21.50 to 23.00

GRAY FORGE

Valley furnace	15.50
Pittsburgh district fur.	16.00 to 16.50
Pittsburgh, delivered	16.63 to 17.63

CHARCOAL

Lake Superior, del. Chi.	16.50 to 20.00

SILVERY

Jackson County, O., fur. in per cents: 6—$19; 7—$19.50; 8—$19.00 to $21.00; 9—$20.50; 10—$21; 11—$22; 12—$23; 13—$25.

BESSEMER FERROSILICON

Jackson County, O., fur. in per cents: 10—$23; 11—$24; 12—$25; 13—$27; 14—$29; 15—$31; 16—$33.

Coke

Prices Per Net Ton

Beehive Ovens

Connellsville furnace	$2.25 to 2.35
Connellsville foundry	3.25 to 4.50
New River foundry	6.00
Wise county foundry	4.25 to 5.00
Wise county furnace	3.50 to 4.25

By-Product Foundry

Newark, N. J., del.	8.70 to 9.10
Chicago, ovens	7.50
New England, del.	10.50
St. Louis, del.	8.50
Birmingham, ovens	4.50 to 5.00
Indianapolis, del.	8.25
Ashland, Ky., ovens, Connell., basis	5.50
Portsmouth, O., ovens Connell., basis	5.50
Buffalo, ovens	8.00 to 8.50
Detroit, ovens	8.00
Philadelphia, del.	8.75

Iron Ore

LAKE SUPERIOR ORE

Gross ton, 51½%, Lower Lake Ports

Old range bessemer	$4.80
Mesabi bessemer	4.65
Old range nonbessemer	4.65
Mesabi nonbessemer	4.50
High phosphorus	4.40

EASTERN LOCAL ORES

Cents per unit delivered at Eastern Pennsylvania and New Jersey furnaces

Foundry and basic, 56-63%, contract	9.00
Copper-free low phos. 58-65%	nom.

FOREIGN ORE

Cents per units, alongside docks Atlantic ports

Foreign manganiferous ore, 45-55% iron, 6-10% man.	9.50 to 10.00
North African low phos.	8.00 to 9.00
Swedish basic, 65%	8.00
Swedish low phos.	9.00
Spanish, North African basic, 50 to 60%	7.00 to 8.50
Newfoundland fdy., 55%	8.00
Tungsten, spot and future short ton unit, duty paid	$11.00 to 11.25
Chrome ore, 48% net ton c.i.f.	$18.00 to 19.00

Manganese Ore

Prices, not including duty, are cents per unit; cargo lots.

Caucasian, 52-55% (nom.)	26 cents
South African, 52%	23 to 24 cents
South African, 49-51%	22 to 23 cents
South African, 44-47%	21.00 to 21.50
Indian, 48-50%	nom.
Brazilian, 46-48% (nom.)	nominal

Refractories

FIRE CLAY BRICK

Per 1000 f.o.b. Works

First Quality

Pennsylvania, Ohio, Illinois, Kentucky, Maryland, Georgia, Alabama	$38.00
Missouri	35.00

Second Quality

Pennsylvania, Ohio, Illinois, Kentucky, Missouri, Maryland	25.00 to 30.00
Georgia, Alabama	30.00

SILICA BRICK

Pennsylvania	38.00
Joliet, Ill., East Chicago, Ind.	47.00
Birmingham, Ala.	50.00

MAGNESITE BRICK

Per Net Ton

9 x 4½ x 2½	$65.00

CHROME BRICK

Per Net Ton

F.o.b. shipping point	$45.00

MAGNESITE

Dead burned grain, net ton, Chester, Pa., or Baltimore bases	40.00
Domes, Chewelah, Wash., base	22.00

CHROME BRICK

Net ton, Chester, Pa., and Balt. base, 9 x 4½ x 2½	45.00

Semifinished Steel

Prices Per Gross Ton

BILLETS AND BLOOMS

4 x 4-inch base

Pittsburgh, open-hearth	$27.00 to 29.00
Pittsburgh, bessemer	27.00 to 29.00
Youngstown	27.00
Cleveland	27.00
Philadelphia	34.30
Chicago	30.00
Forging, Chicago	35.00 to 36.00
Forging, Pittsburgh	34.00 to 35.00
Forging, Philadelphia	39.30

SHEET BARS

Pittsburgh	27.00 to 28.00
Youngstown	27.00
Cleveland	27.00
Chicago	29.00

SLABS

Pittsburgh	29.00
Youngstown	27.00
Cleveland	27.00

WIRE RODS

Pittsburgh, Cleveland	35.00 to 37.00
Chicago	36.00 to 38.00

SKELP

All grades, Pittsburgh	1.50c

Ferroalloys

(In dollars, except Ferrochrome)

*Ferromanganese, 78-82%, tidewater, duty paid	$75.00
*Ferromanganese, del. Pittsburgh	79.79
Spiegeleisen, 19-20%, domestic fur. spot†	27.00
Ferrosilicon, 50 per cent, freight all., c. l.	77.50
Do, less carload	85.00
Do, 75 per cent	126.00 to 136.00
Silicomang., 2½% carb.	105.00
2% carbon	110.00
1% carbon	115.00
(Spot prices, $5 a ton higher.)	
Ferrochrome, 60-70 chromium, 4-6 carbon, cts. lb. con. del.	10.00
Do, for spot delivery	10.50
Ferrotungsten, stand., lb. cont.	1.10 to 1.20
Ferrovanadium, 30-40 per cent, per lb. contained, on analysis	3.05 to 3.30
Ferro-titanium carload producers' plants, net ton	140.00
Do, one-ton to c. l.	160.00
For 1932 contracts, f.o.b. freight allowed	140.00
Ferrophosphorus, per ton, carload 17-19 per cent, Rockdale, Tenn., basis, (18 per cent)	91.00
Ferrophosphorus, electrolytic per ton carload, 23-25% f.o.b. Anniston, Ala., 24%	122.50
Ferromolybdenum, stand. 50-60 per cent, per lb.	$1.00
Cal. Molybdate, lb. cont.	.85

†Carloads. Differentials apply to quant.
*To users of carloads to 1000 tons annually. Differentials to large users.

Fluorspar

85 and 5 per cent grade

Washed gravel Kentucky, Illinois mines, net ton	$13.00
Washed gravel, import duty paid tide. gross ton	13.50

Pig Iron

Buffalo Market Down $1—Freight Increases Add to Costs—Two Stacks Resume

PIG IRON PRICES, PAGE 179

Buffalo—Pig iron prices have been reduced $1 a ton for local delivery to $16, base, furnace, the lowest since 1914. Quotations for outside delivery have not been changed. A slight improvement in sales followed the price adjustment.

Pittsburgh—The pig iron market is bare of inquiry, and new orders and shipments continue small. Prices are untested. The Shenango Furnace Co. has banked one of its Sharpsville, Pa., stacks which was in blast several weeks.

New York—With trading practically at a standstill, sellers are concerned principally with new freight surcharges, effective Jan. 4. One estimates more than 30 cents a ton will be added to the cost of making pig iron. Chateaugay Ore & Iron Co.'s furnace at Standish, N. Y., is scheduled to go into blast Jan. 4.

Philadelphia—Pig iron orders are comprised entirely of small lots, with the majority for foundry iron going at $15, base, eastern Pennsylvania furnace.

Youngstown, O.—The market is quiet. A steelmaker has put the blast on a banked stack because of a slight increase in open-hearth operation which is expected to subside in a few days. Prices are steady.

Cleveland—Furnace interests with headquarters in Cleveland booked approximately 3000 tons in the past week, in small lots for early shipment. Interest for the present is at a low ebb. Prices are unchanged.

Cincinnati—An order for 500 tons of northern foundry iron on an inquiry for 1000 tons shows prices are weaker, on keen competition from furnaces willing to absorb freight.

Chicago—Further clarification of pig iron prices is expected this week. The northern quotation is nominal at $16.50. Sales of charcoal iron are reported at $16.50, East Chicago docks. Shipments in advance of the freight increase, 13.3 cents per gross ton, effective Jan. 4, are picking up sharply.

St. Louis—Shipments and consumption in December were at the lowest rate of the year. Some melters have reached the bottom of stocks and will be required to purchase some iron in January.

Birmingham, Ala.—The Tennessee Coal, Iron & Railroad Co. is blowing in an additional furnace at Ensley.

Toronto, Ont.—Melters are holding stocks to the minimum pending the taking of inventories. Business in the market practically vanished in the last week of the year.

Ferroalloy Shipments Expected To Increase

Ferroalloy Prices, Page 179

New York—Sellers of ferromanganese look for improvement in specifications shortly. Ferromanganese continues at $75, duty paid, on contracts up to 1000 tons. Domestic spiegeleisen, 19 to 21 per cent, is fairly steady at $27, furnace.

Pittsburgh—Consumers are slightly more active in contracting for ferroalloys. Shipments, however, are slow to increase.

Coke Shipments to Foundries Are Heavier

Coke Prices, Page 179

Pittsburgh—Shipments of beehive foundry coke are slightly heavier. The market continues $3.25 to $4.50. Furnace coke demand is little changed, with the spot market at $2.25.

New York — With the inventory season nearly over, coke sellers look for improvement in specifications. Prices are steady. Effective Jan. 4, a surcharge of 12 cents a net ton applies on shipments.

Cincinnati — Foundry coke shipments are slow. Demand for other grades also is at a minimum.

Chicago—Recently reported concessions of 50 cents in the oven price of by-product foundry coke in this district have proved erroneous. All of the 1932 contract business thus far closed has been at $7.50 ovens.

Birmingham, Ala.—A few additional coke ovens have been lighted at Fairfield, production now being nearer 50 per cent.

Boston Buying 2100 Tons of Cast Pipe

New York—Public Service Electric & Gas Co. of New Jersey, is in the market for additional cast pipe. Brooklyn Union Gas Co. will purchase a fair tonnage of special fittings. Municipal buying and inquiry have slumped. Prices are weak with $30 foundry, and under prevailing.

Boston—Boston has bids on more than 2100 tons of cast pipe and a large tonnage of fittings.

Chicago—Cast pipe foundries are down for inventories. Sewage treatment jobs for 1932 are fairly numerous but much depends on sale of bonds. Lincoln, Nebr., is asking bids on a $750,000 issue of water extension bonds.

Cast Pipe Placed

904 tons, 24-inch class 100, Long Beach, Calif., to United States Pipe & Foundry Co., East Burlington, N. J.

600 tons, 12-inch, Hartford, Conn., to R. D. Wood & Co., Florence, N. J.

300 tons, 32,000 feet, 2 to 6-inch, Waldport, Oreg., to Gates Pipe Co., Dallas, Oreg., through D. T. Slater, Dallas, Oreg.

221 tons, 10-inch class 200 and 250, Burbank, Calif., to United States Pipe & Foundry Co., East Burlington, N. J.

206 tons, 16-inch class 150, Beverly Hills, Calif., to United States Pipe & Foundry Co., East Burlington, N. J.

100 tons, 6000 feet, 6-inch, The Dalles, Oreg., to Pacific States Pipe Co., Provo, Utah.

Steel Pipe Placed

665 tons, 30 and 42-inch, welded steel pipe, Los Angeles, to Western Pipe & Steel Co., Los Angeles.

Unstated tonnage, steel conduit pipe, eastern yards, United States navy, to Youngstown Sheet & Tube Co., Youngstown, O., at $5119.61.

Unstated tonnage, approximately 20 miles various sizes, natural gas system, Borger, Tex., to Joseph Greenspon's Sons Iron & Steel Co., St. Louis.

Cast Pipe Pending

3000 tons, estimated, small sizes, Brooklyn Union Gas Co., Brooklyn, N. Y.

2100 tons, 4 to 16-inch with fittings, Boston. Included 675 tons, boxes, gate and hydrant parts. United States Pipe & Foundry Co., East Burlington, N. J., low.

300 tons, 8-inch, Public Service Electric & Gas Co., New Jersey.

100 tons, 10 and 14-inch, Bristol, R. I.; bids in.

100 tons, miscellaneous sizes, sewage disposal plant, Decatur, Ill., sanitary district, being purchased through Pearse, Greely & Hansen, Chicago.

Steel Pipe Pending

8011 tons, 36 and 60-inch, Buffalo; Far- & Trefts Inc., Buffalo, low if steel at $214,577. United States Pipe & Foundry Co., East Burlington, N. J., low if cast iron at $243,543. J. H. Ruckel & Son, representing steel pipe interests, bid $199,531 on 2619 tons of steel pipe. Bids are under advisement.

850 tons, 18 and 20-inch, welded steel pipe, Signal Hill, Calif.; alternate bids on cast iron and reinforced concrete pipe taken Dec. 28.

Unstated tonnage, steel pipe, Pennsylvania railroad, contract 2-1932; bids Jan. 12.

Scrap

Quiet Rules with Shipments in Abeyance and Prices Largely Nominal—Plan Lake Shipment

Chicago—Negotiations are understood to be under way for large shipments of steelmaking, blast furnace and other grades of scrap to the East by boat at the opening of navigation. Early closing of these negotiations would mean that shipments to docks would start shortly against orders. Quotations are nominal in absence of trading. Rerolling rails have sold recently on a slightly higher basis, and quotations have been marked up 25 cents by some dealers. Increase in ingot capacity by the leading steelworks interest in the last year is expected to indicate that purchases in the open market may become more frequent from that melter.

New York—A consumer of heavy melting steel in the Buffalo district plans to purchase for barge storage di-

Iron and Steel Scrap Prices

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated

HEAVY MELTING STEEL

Birmingham	7.00 to 7.75
Boston, dealers	4.00 to 4.50
Buffalo, No. 1	8.00 to 8.25
Buffalo, No. 2	6.25 to 6.50
Chicago	7.50 to 8.00
Cinci., deal.	6.75 to 7.25
Cleve., No. 1	7.25 to 7.75
Cleve., No. 2	7.00 to 7.50
Det., No. 1 deal.	5.50 to 6.00
Det., No. 2 deal.	4.00 to 4.50
E. Pa. del. mill	7.00 to 8.00
N. Y. deal. R. R.	4.50 to 5.50
N. Y. deal. No. 2	3.50 to 4.00
N. Y. deal. yd.	3.50 to 4.00
Pitts. No. 1	10.00 to 10.50
St. L. No. 1 sel.	7.75 to 8.25
Federal, Ill.	7.00 to 7.50
Granite City, Ill.	6.75 to 7.25
Valleys, No. 1	9.00 to 9.50

COMPRESSED SHEETS

Buffalo, dealers	6.25 to 6.50
Chi. (Factory)	6.00 to 6.50
Cleveland	7.00 to 7.25
Detroit, dealers	5.50 to 6.00
E. Pa. new mat.	7.00 to 8.00
Pittsburgh	9.75 to 10.25
Valleys	8.25 to 8.75

BUNDLED SHEETS

Buffalo	5.75 to 6.25
Cinci., deal.	6.25 to 6.75
Cleveland	6.00 to 6.50
Eastern Pa.	6.00 to 6.50
Pittsburgh	9.25 to 9.75
St. Louis	3.50 to 4.00

SHEET CLIPPINGS LOOSE

Chicago	3.75 to 4.25
Cincinnati	3.50 to 4.00
Detroit, dealers	3.00 to 3.50
St. Louis	3.50 to 4.00

STEEL RAILS SHORT

Birmingham	10.00 to 11.00
Boston, dealers	4.25 to 4.75
Buffalo	11.25 to 11.75
Chicago (3 ft.)	8.75 to 9.25
Chicago (2 ft.)	9.75 to 10.25
Cinci., deal.	12.00 to 12.50
Detroit, deal.	10.50 to 11.00
Pitts. (open-hearth, 3 ft. and less)	12.00 to 12.50
St. Louis	11.50 to 12.00

STOVE PLATE

Birmingham	6.50 to 7.00
Boston, con.	4.50 to 5.00
Buffalo	8.25 to 8.75
Chicago, net	6.00 to 6.50
Cinci., deal. net	4.50 to 5.00
Det., net deal.	3.00 to 3.50
Eastern Pa.	7.00
N. Y., deal. mill	4.75 to 5.50
St. Louis	6.50 to 7.00

COUPLERS, SPRINGS

Buffalo	11.00 to 11.50
Chicago	8.50 to 9.00
Eastern Pa.	10.50 to 11.00
Pittsburgh	10.75 to 11.25
St. Louis	8.50 to 9.00

ANGLE BARS—STEEL

Chicago	8.00 to 8.50
St. Louis	7.50 to 8.00

LOW PHOSPHORUS

Buffalo, billets and bloom crops	12.00 to 12.50
Cleveland bil. and bloom crops	14.00 to 14.50
Eastern Pa.	12.00 to 13.00
Pittsburgh billet bloom crops	14.00 to 14.50
Pitts., sheet bar crops	13.00 to 13.50

FROGS, SWITCHES

Chicago	7.75 to 8.00
St. Louis	8.50 to 9.00

SHOVELING STEEL

Chicago	7.50 to 8.00
Cleveland	6.25 to 6.50
St. Louis	7.00 to 7.50

RAILROAD WROUGHT

Birmingham	7.00 to 7.25
Boston, dealers	7.50 to 8.00
Buffalo, No. 1	6.25 to 6.50
Buffalo, No. 2	8.00 to 8.25
Chicago, No. 1	7.25 to 7.85
Chicago, No. 2	7.50 to 8.00
Cinci., No. 2	6.75 to 7.25
Eastern Pa.	9.50
N. Y., No. 1, deal.	7.00 to 7.50
Pitts., No. 2	10.00 to 10.50
St. Louis, No. 1	5.00 to 5.50
St. Louis, No. 2	6.75 to 7.25

SPECIFICATION PIPE

Boston	4.00 to 4.25
Eastern Pa.	9.50 to 10.00
N. Y., deal.	5.00 to 5.50

BUSHELING

Buffalo, No. 1	6.25 to 6.50
Chicago, No. 1	5.50 to 6.00
Cinn., No. 1 dl.	5.00 to 5.50
Cinn., No. 2	3.50 to 4.00
Cleve., No. 2	4.25 to 4.50
Det., No. 1 new deal.	4.50 to 5.00
St. L., No. 1	6.00 to 6.50
Val. new No. 1	8.50 to 9.00

MACHINE TURNINGS

Birmingham	3.00 to 3.50
Boston, dealers	1.30 to 1.50
Buffalo	4.75 to 5.25
Chicago	4.00 to 4.50
Cinn., deal.	3.25 to 3.75
Cleveland	4.00 to 4.50
Detroit	3.00 to 3.50
Eastern Pa.	4.50
N. Y., deal.	1.50 to 2.00
Pittsburgh	7.00 to 7.50
St. Louis	3.00 to 3.50
Valleys	6.50 to 7.00

BORINGS AND TURNINGS
For Blast Furnace Use

Boston, dealers	1.25 to 1.50
Buffalo	6.25 to 6.50
Cinn., deal.	3.25 to 3.75
Cleveland	4.25 to 4.75
Detroit, deal.	3.50 to 4.00
Eastern Pa.	3.00 to 3.50
N. Y., deal.	1.50 to 2.00
Pittsburgh	6.75 to 7.00

CAST IRON BORINGS

Birming., chem.	12.50 to 13.00
Birming., plain	3.00 to 3.50
Boston, chem.	6.50 to 7.25
Boston, deal.	1.50 to 1.75
Buffalo	6.00 to 6.25
Chicago	3.00 to 3.50
Cinn., deal.	3.25 to 3.75
Cleveland	4.25 to 4.75
Detroit, deal.	3.50 to 4.00
Eastern Pa.	3.00 to 3.50
E. Pa., chem.	10.50 to 12.00
N. Y., deal.	2.00 to 2.50
Pittsburgh	6.75 to 7.00
St. Louis	5.50 to 6.00

PIPE AND FLUES

Cinn., deal.	6.00 to 6.50

RAILROAD GRATE BARS

Buffalo	6.25 to 6.50
Chicago, net	5.75 to 6.25
Cincinnati	5.50 to 6.00
Eastern Pa.	7.00
N. Y., deal.	5.00 to 5.50
St. Louis	6.00 to 6.50

FORGE FLASHINGS

Boston, deal.	5.00 to 5.25
Buffalo	6.25 to 6.50
Cleve. ov. 10 in.	7.00 to 7.50
Detroit	4.75 to 5.25

FORGE SCRAP

Boston, del.	2.00 to 2.25
Chicago	10.50 to 11.00
Eastern Pa., del.	6.75

ARCH BARS, TRANSOMS

Chicago, net	8.50 to 9.00
St. Louis	6.50 to 7.00

AXLE TURNINGS

Boston, deal.	6.75 to 7.00
Buffalo	7.00 to 7.50
Chi., steelworks	6.00 to 6.50
Cleveland	6.75 to 7.00
Eastern Pa. del.	7.00 to 8.00
Pittsburgh	9.25 to 9.75
St. Louis	6.50 to 7.00

STEEL CAR AXLES

Birmingham	11.50 to 12.00
Boston, ship. pt.	11.00 to 12.00
Buffalo	12.00 to 12.50
Chicago	12.25 to 12.90
Eastern Pa.	15.50 to 16.00
St. Louis	11.50 to 12.00

SHAFTING

Bos., ship. pt.	10.00 to 10.50
Chicago	7.85 to 8.40
N. Y., deal.	9.00 to 9.50
St. Louis	9.00 to 9.50
E. Penna.	15.00 to 15.50

CAR WHEELS

Birming. iron	8.00 to 9.00
Boston, iron	12.50 to 13.50
Buffalo, iron	10.00 to 10.50
Buffalo, steel	10.50 to 11.00
Chicago, iron	8.00 to 8.50
Chi., rolled steel	8.50 to 9.00
Cincinnati, iron	9.50 to 10.00
E. Pa. steel	10.00 to 10.50
E. Pa. iron	11.00 to 11.50
Pitts. iron	10.00 to 10.50
Pitts., steel	10.75 to 11.25
St. Louis, iron	7.00 to 7.50
St. Louis, steel	7.50 to 8.00

NO. 1 CAST SCRAP

Birmingham	8.50 to 9.00
Buffalo (Mach.)	9.50 to 10.00
Boston, textile	7.00 to 8.50
Chicago, mach.	8.90 to 9.50
Chi., railroad	8.10 to 8.70
Chicago, agri.	7.50 to 8.10
Cinn., mach. cup., gross	10.00 to 10.50
Cleve. cupola	10.00 to 10.50
Det., net deal.	8.00 to 8.50
E. Pa. cupola	11.50
N. Y. cup. deal.	7.00 to 7.50
N. Y., del. local foundries	12.00
Pitts., cupola	10.00 to 10.50
San Fran., del.	13.50 to 14.00
Seattle	5.00 to 7.50
St. L. No. 1 ma.	8.50 to 9.00
St. L., No. 1	7.50 to 8.00

HEAVY CAST

Boston	6.00 to 6.50
Bost. mach. cast	8.00 to 9.00
Buffalo, break	6.25 to 6.50
Cleve., break	6.00 to 6.50
Detroit, auto, net deal.	10.00 to 10.50
Det., break., dl.	4.75 to 5.25
Eastern Pa.	9.00 to 9.50
N. Y. break, dl.	5.75 to 6.00
N. Y. No. 1 dl.	7.00 to 7.50
Pittsburgh	8.00 to 8.75

MALLEABLE

Boston R. R.	11.50 to 12.00
Buffalo	9.75 to 10.25
Chicago, agri.	7.00 to 7.50
Chicago, R. R.	7.00 to 7.50
Cinci., R. R. del.	9.25 to 9.75
Cinci., agri. del.	9.00 to 9.50
Cleveland, rail	10.00 to 10.50
Det. auto deal.	9.00 to 9.50
St. Louis, rail	6.00 to 6.50

RAILS FOR ROLLING
5 feet and over

Birmingham	10.00 to 10.50
Boston, deal.	6.00 to 7.00
Buffalo	9.50 to 10.00
Chicago	10.25 to 10.75
Eastern Pa.	11.50 to 12.00
New York	6.25 to 6.75
St. Louis	9.50 to 10.00

LOCOMOTIVE TIRES

Chicago, cut	10.00 to 10.50
St. L., No. 1	9.00 to 9.50

LOW PHOS. PUNCHINGS

Chicago	10.00 to 10.50
Buffalo	11.50 to 12.00
Eastern Pa.	13.00
Pittsburgh	11.00 to 11.50

rect for later shipment. This buyer has been purchasing heavily from dealers for barge shipment during the season recently closed and later for dealer storage.

Philadelphia—Scrap is unchanged and slow. Bethlehem Steel Co. has bought a few hundred tons additional for Bethlehem, Pa., and Sparrows Point, Md., at $7, delivered.

Buffalo — Tentative inquiry for scrap grades which were in no demand in December indicates some gain in activity. Generally lower prices are indicated.

Bethlehem Steel Co. has bought 1200 tons more of heavy melting steel for Lackawanna furnaces, making 4000 tons bought at $8, delivered.

Pittsburgh—Scrap shipments still are deferred at most plants and new buying is negligible. Prices are nominal and generally unchanged. Offerings are light, the January list of the Pennsylvania railroad totaling only 12,900 net tons, including 2000 tons of heavy melting steel and 2350 tons of steel rails.

Cleveland—Lifting of a local embargo on iron and steel scrap shipments is permitting dealers to make some deliveries. Quotation on all grades are unchanged.

Cincinnati—New business is absent from the scrap market and shipments to important consumers have been virtually suspended for the last three weeks.

Birmingham, Ala.—Early scrap requirements for the new year are light. Quotations are nominally unchanged.

St. Louis—The year starts with slack demand for all grades of iron and steel scrap and prices at the lowest levels in recent times.

Toronto, Ont.—Few inquiries are being received and those for small tonnages. Dealers are out of the market and prices are unchanged.

Bolt, Nut, Rivet Bookings Good; Specify Slowly

Bolt, Nut, Rivet Prices, Page 175

Pittsburgh—Buyers of bolts, nuts and rivets are postponing placing of specifications until actual needs develop. First quarter contracting is nearly complete with prices held fairly well at 73, 10 and 10 off for bolts and nuts and 2.25c, Pittsburgh, for large rivets.

New York—Bolt and nut prices are expected to come in for severe test over the next two or three weeks. Until recently, an extra five has been available on spot shipments.

Chicago—Checking of stocks by consumers gives prospects of heavier releases earlier in January. Prices for bolts and nuts are indefinite, but rivet discounts remain steady.

Operations Rise; Now At 20-24 Per Cent

Pittsburgh—Ingot production was 25 per cent last week, up seven points from the week before. Blast furnaces active number 10 stacks of 54.

Monessen, Pa., plant of Pittsburgh Steel Co. resumed operations Jan. 3 after two-weeks shutdown.

Philadelphia — Ingot operations last week were at 14-15 per cent, down one point from the prior week.

Operations, week of Jan. 2	**20-24**
Operations, week of Dec. 26	**15-20**
Operations, week of Dec. 19	**24**
Operations, this week, 1931	**36**
High for 1931 (March 19)	**57**
Low for 1931 (Dec. 26)	**15-20**

A pickup of a few points is expected this week.

Buffalo—Operations during the four days prior to Jan. 1 averaged 27 per cent with a suspension of production from Jan. 1-4. About the same rate is indicated for this week.

Youngstown, O.—Ingot production was at 32 per cent last week, up three points from the week prior.

Cleveland—Ingot production was at 32 per cent last week, up 16 points from the low the week prior due to Christmas suspension. The former rate will hold through this week.

Chicago—Ingot output remained at 18-20 per cent last week, unchanged from the week prior, although finishing mill schedules were improved. This week steel production will be up about a point to 20 per cent.

Birmingham, Ala.—Ingot production was at 50 per cent last week following holiday inactivity the week before. This represented five active open hearths each at Fairfield and Ensley, Ala. This week the rate will be 60 per cent with addition of three Gadsden, Ala., open hearths. Tennessee Coal, Iron & Railroad Co. started a blast furnace and rail mill Jan. 4.

Operations at the Ford Motor Co.'s Blueberry iron ore mine, near Ishpeming, Mich., on the Marquette range, have been reduced one-half. Two crews will continue to be employed, one working one week, the other the next, 5 days a week, with no night work.

Britain Feels New Urge As Inquiries Increase

London—(*By Radio*)—Seasonal slowing of markets at the year's end has been noticeable and inactivity has been general. Inquiries at the beginning of the new year are encouraging and furnaces are preparing to restart. Deliveries of foreign ore are increasing.

A producer in Lincolnshire has obtained a substantial contract for pig iron for delivery in the United States. British coke is also being bought by interests in the United States.

Continental markets are dull, although Belgium reports a slight revival. Producers in Germany are absenting themselves from the market because of low prices prevailing on their export sales.

Warehouse Trading Dull Following 1931 Lows

New York—Prices are inclined to be soft with adjustments pending in line with recent mill reductions. A moderate increase is expected this month.

Philadelphia—Following the recent cold-finished revision, prices are unchanged.

Pittsburgh—Changes in prices of several products are in prospect. December business was lighter than November.

Cincinnati—December tonnage was decidedly lighter than November's.

Chicago — December warehouse sales were the lowest of the year. Weakness persists in bolts and nuts and some wire products.

St. Louis—Sales of 1931 were the smallest of any year since 1921, December being the lowest month.

Sheet Bars Reduced $1 a Ton at Chicago

Semifinished Prices, Page 179

Pittsburgh—Prices of sheet bars, billets and slabs are receiving little test and are not clearly defined. The former nominal market of $29 has been shaded on recent orders. Shipments of wire rods have been stimulated by the advance of $2 to $37

for first quarter, coupled with the higher freight rate effective Jan. 4.

Philadelphia—Effective Jan. 4 a freight surcharge of 44.8 cents will be added to the $5.30 Pittsburgh-Philadelphia rate on semifinished steel. This surcharge applies where the rate is $4.48 or more; where it is less, an increase of 10 per cent on the present rate applies.

Cleveland—The leading merchant producer here has not named specific prices for first quarter, though the usual current price continues $27, Cleveland and Youngstown, O., for sheet bars, billets and slabs. Material is being billed at this figure on short-term arrangements.

Youngstown, O.—Few contracts have been booked for first quarter, consumers indicating they will specify only as required. Sheet bars, billets and slabs are offered at $27, Youngstown and Cleveland.

Chicago—Billets and blooms are nominal and unchanged at $30 base, Chicago, but sheet bars, in line with reductions in the East, now are $1 lower, at $29, Chicago. Producers are naming $30 as the first quarter price for billets and blooms.

Steel Weathering Economic Gale but Strain May Compel Overhauling

(*Concluded from Page* 127)

verters were occupied 57 per cent in 1915, 62 per cent in 1930.

The increase in open-hearth steel making capacity in 15 years has been 28,713,820 tons and the shrinkage in bessemer capacity 6,356,853 tons, or a net gain in capacity of all kinds of 22,356,967 tons. But the actual advance in production of all kinds of steel ingots and castings has been only 8,118,316 tons, crucible and electric steel not being included.

In the blast furnace department of the iron and steel industry scrap has provided a variable of increasing intensity. Coke blast furnaces in 1915 had a potential capacity of 45,033,825 tons, which was stepped up 13 per cent to 51,850,775 tons by 1930. Meanwhile, this capacity was 66 per cent engaged in 1915, producing 29,524,789 tons, while in 1930 a 59 per cent rate resulted in 31,020,907 tons.

Whether the moratorium on increased steelmaking capacity dictated by the logic of events in 1931 holds over into better times is an open question, and concerted action might not be permissible under the anti-trust laws. In 1929, when the industry reached new altitudes, open-hearth capacity was engaged 87 per cent, bessemer capacity 84, blast furnace capacity 80. The general expectation is that a few years will elapse before the 1929 records are surpassed, yet at present open-hearth and bessemer capacity is 3,900,000 tons greater than in lush 1929, and even coke pig iron capacity has been put up 900,000 tons.

Meanwhile, capital expenditures of steelmakers have been pouring into finishing capacity, particularly in the sheet and strip divisions of the industry. The goal is increased tonnage at lower unit cost. Rolling mill equipment is being speeded up, controls are increasingly selective, and there appears to be a tendency to extend finishing capacity beyond the point of integration. If earning the full common dividend paid in 1931 is a measure of accomplishment, then National Steel has performed unusually well, and financial authorities note with emphasis that the finishing capacity of National is 110 per cent of its ingot capacity.

If mechanization is to be a virtue in the period of intensified competition which almost certainly will be a phenomenon of returning prosperity, then steel is well qualified. A survey made by STEEL in 1931 showed that the number of man-hours required to produce a gross ton of steel ingots is approximately 4.14.

Whether the capital structure of steel requires overhauling may prove a fertile topic as a low level of prices acts as a drag on profits when tonnage demand is again experienced. On a 1929 basis, the latest for which comparisons with other "key" industries are available, steel would not appear to be out of line.

As the chart on page 127 depicts, the greatest turnover of capital is enjoyed by the automobile industry, with rubber second and iron and steel third. Ranking inferior to iron and steel are the paper-pulp and oil industries, the railroads and agriculture. A comparison of capital investment and value of the year's sales for 1929 folows:

Industry	Capital Investment	Value of Year's Sales
Iron and steel	$4,500,000,000	$2,338,000,000
Agriculture	54,074,000,000	5,603,000,000
Railroads	18,510,000,000	6,279,000,000
Oil	12,000,000,000	1,347,000,000
Paper and pulp	2,671,000,000	1,138,000,000
Automobile	1,881,000,000	4,415,000,000
Rubber	1,250,000,000	1,147,000,000

Unquestionably, the automotive industry possesses a tremendous advantage in being strictly a "finishing industry." Frequently it handles its raw material from the receiving dock direct to the department processing it. Contrast this with the huge reserves of ore and coal lands which steel producers feel obligated to carry as a matter of protection.

Whether such large reserves are an absolute necessity may be open to question. Recurring reports of almost inexhaustible supplies of rich ore in South America and Africa, accessible by gravity to cheap water transportation, conceivably might change the entire face of the industry before Lake Superior's richest ores are exhausted. This is not a probability, but it is a possibility. When steel balance sheets are scrutinized, as they are certain to be, the question may be raised whether present stockholders are carrying too great a burden on behalf of unknown future shareholders.

During the tenure of President Hoover, which is at least to March 4, 1933, there is no reasonable chance that the present tariff law will be altered appreciably. Should the national administration change as a result of the 1932 election, a special session of congress beginning in the spring of 1933 would be the sequel. Tariff legislation undoubtedly would rank high, and a new schedule of duties and a longer free list would apply sometime in midsummer.

Present Tariff for 18 Months

This would insure industry operating through 1932 and probably half of 1933 under the present law, and in this 18-month period there will be other worries transcending the tariff in importance. For steel it is not a major problem, anyway, if an estimate of exports of 725,000 tons and imports of 425,000 tons of all iron and steel products, except scrap, are to be contrasted with a domestic production of 18,328,000 tons of coke iron and 25,597,000 tons of steel ingots and castings. In the coast markets, imports are vexing and may be increasingly so as Europe regains her feet. But for the greater interior markets which make steel a major industry the tariff problem is minor.

Steel in 1932 will experience the sensations of a man on gaining his liberty after being confined to his bed for many months. Basically, the industry is sound, there are few weak spots in its finances, it is thoroughly mechanized, the chart at the foot of its bed is assuring. But on taking its first strides there will be shooting pains and many irritations, and its gait will be halting. Taxes will bear down more heavily, the work week may be shorter, the continuous mills will be found more strongly intrenched in the flat rolled divisions of the industry, there will be adjustments of wage rates necessitated by mechanization, and the first showing of sizable business will sorely tempt old methods of marketing.

Iron Output Drops Sharply As 10 Furnaces Blow Out

PRODUCTION of coke pig iron in the United States suffered a severe drop in December and for the first time since September, 1921, output was less than a million-ton figure. With a net loss of 10 blast furnaces from the active list, only 57 were operating on the last day of the year, a figure establishing a new low record for all time. At the bottom of the 1921 depression, 69 furnaces were making iron.

Pig iron made in 1931 totaled only 18,265,155 gross tons, which compared with the 31,441,488 tons of 1930, was a loss of 13,176,333 tons, or 41.8 per cent. In 1921, the previous low production year, the total was 16,506,564 tons.

AVERAGE DAILY PRODUCTION

	1931	1930	1929	1928
Jan.	55,337	91,573	110,742	92,113
Feb.	61,114	101,640	114,942	99,954
Mar.	65,448	104,930	119,662	103,199
Apr.	66,986	106,371	122,106	106,066
May	64,355	104,564	125,753	106,219
June	54,599	97,817	123,887	102,745
July	47,170	85,110	122,016	99,120
Aug.	41,264	81,455	120,845	101,193
Sept.	38,947	75,893	116,548	102,120
Oct.	37,831	69,851	115,747	108,824
Nov.	36,727	62,182	106,081	110,155
Dec.	31,694	53,732	91,513	108,702
Ave.	50,041	86,141	115,808	103,365

According to estimates of December iron production supplied to STEEL by blast furnace operators, the total output for the month was 982,521 gross tons. This was a decrease of 119,299 tons, or 10.8 per cent, from the 1,101,820 tons made in November. December had 31 days, against 30 in November. The December figure was the lowest since the 954,901-ton total of August, 1921. The all-time low point was 864,642 tons in July, 1921.

Average daily production in December was 31,694 tons, which compared with the 36,727-ton output of the preceding month, was a decline of 5033 tons, or 13.7 per cent. This production was also the lowest since August, 1921, when the rate was 30,802 tons per day. July, 1921, with 27,892 tons per day established the all-time low point. For eight consecutive months pig iron has dropped steadily from the year's high point of 66,986 tons in April.

With the blowing out or banking of 10 furnaces in December, the number of operating units was reduced from 67 on Nov. 30 to 57 on Dec. 31. Of the merchant class, 2 stacks were blown in and 4 were made inactive, the net loss being 2. Of the nonmerchant or steelworks class, 4 were blown in and 12 were blown out or banked, the net loss for this class being 8. Since the 1931 high point of 116 furnaces producing iron on March 31, the reduction has been unbroken and during this 9-month period, 59 furnaces became inactive.

Relating production to capacity, operations in December were at a rate of 22.0 per cent, against 25.5 per cent in November and 26.3 per cent in October.

With Bethlehem Steel Co.'s announced intention of demolishing furnaces C and H at its Lackawanna plant (STEEL, Dec. 21, page 20), the total number of potential furnaces in the United States has been reduced from 303 to 301.

DECEMBER IRON PRODUCTION

	No. in blast last day of month Dec.	Nov.	Total tonnage made
Ohio	11	18	209,907
Pennsylvania	16	17	249,540
Alabama	6	6	79,876
Illinois	6	6	125,401
New York	6	6	90,734
Colorado	0	0	
Indiana	5	5	
Maryland	2	3	137,198
Virginia	0	0	
Wisconsin	0	0	
Kentucky	0	1	
Massachusetts	0	0	
Tennessee	0	0	54,206
Utah	1	1	
West Virginia	2	2	
Michigan	2	2	
Minnesota	0	0	19,862
Missouri	0	0	
New Jersey	0	0	
Spiegel and ferro —all states			15,797
Total	57	67	982,521

MONTHLY PRODUCTION

	1931	1930	1929
Jan.	1,715,443	2,838,751	3,433,028
Feb.	1,711,192	2,845,937	3,218,376
Mar.	2,028,906	3,252,822	3,709,518
April	2,009,582	3,191,119	3,663,167
May	1,995,001	3,241,477	3,898,344
June	1,637,998	2,934,508	3,715,104
July	1,462,270	2,638,441	3,782,511
Aug.	1,279,205	2,525,105	3,746,198
Sept.	1,168,436	2,276,781	3,496,454
Oct.	1,172,781	2,165,374	3,588,146
Nov.	1,101,820	1,865,458	3,182,420
Dec.	982,521	1,665,715	2,836,917
Total	18,265,155	31,441,488	42,270,183

RATE OF OPERATION
(Relation of Production to Capacity)

	1931[1]	1930[2]	1929[3]	1928[4]
January	38.4	65.0	79.0	66.8
February	42.5	72.1	82.2	72.5
March	45.4	74.5	85.5	74.8
April	46.5	75.4	87.4	76.8
May	44.7	74.2	89.8	77.0
June	37.9	69.3	88.5	74.4
July	32.7	60.3	87.2	71.8
August	28.7	57.8	86.4	73.3
September	27.0	53.8	83.3	74.1
October	26.3	49.6	82.6	78.9
November	25.5	44.1	75.8	79.8
December	22.0	38.1	65.5	78.8

[1]Based on capacity of 52,515,875 tons Dec. 31, 1930; [2]on capacity of 51,490,680 tons; [3]on capacity of 51,069,895 tons; [4]on capacity of 50,329,750 tons. Capacities by American Iron and Steel institute.

Pickands, Mather Acquire Pickands, Brown & Co.

Pickands, Mather & Co., Cleveland, have acquired the pig iron and coke sales business of Pickands, Brown & Co., Chicago, and the following executives of the latter company have become partners in Pickands, Mather & Co.: C. P. Wheeler, Seymour Wheeler, Donald Boynton and Clifford D. Caldwell, president of the Interlake Iron Corp.

The consolidation reunites two firms which were together a generation ago and whose business interests have been closely related for nearly a half century. In 1905 Pickands, Brown & Co. were instrumental, with Pickands-Mather and the National Malleable Castings Co., in the formation of the Federal Furnace Co., which later merged with the By-Products Coke Corp. This company formed the nuceleus for the Interlake Iron Corp., organized in 1929.

In addition to being sales agents for Interlake Iron Corp., Pickands-Mather will be merchant pig iron sales agents for the Youngstown Sheet & Tube Co., in Chicago, and coke sales agents for the Milwaukee Coke & Gas Co., and the North Shore Coke & Chemical Co., Chicago.

Addition of the four Chicago members increases the partnership of Pickands, Mather & Co. to eight, the Cleveland members being H. G. Dalton, Elton Hoyt 2nd, Frank Armstrong and S. E. Bool.

Structural Shape Awards

(*Concluded from Page* 177)

Angeles, to Consolidated Steel Corp., Los Angeles.

163 tons, highway work, Lincoln county, Colo., to unnamed interest.

150 tons, high school, Shaler township, Pittsburgh, to Guibert Steel Co., Pittsburgh.

150 tons, warehouse addition, Buffalo, for Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., to McClintic-Marshall Corp., Bethlehem, Pa.

126 tons, bridge, Kauai, T. H., to American Bridge Co., Pittsburgh.

125 tons, bridge spans for Chicago, Milwaukee, St. Paul & Pacific railroad in Iowa, to American Bridge Co., Pittsburgh.

122 tons, bridge, Escanaba, Mich., for Michigan state highway department, to Fort Pitt Bridge Works Co., Pittsburgh.

100 tons, segregation building, Sing Sing, N. Y., to Montgomery Iron & Steel Co., Philadelphia.

Steel Exports and Imports Improve in November

BOTH imports and exports of iron and steel products were greater in November than in October, but the increase in imports was more marked.

The gain in the import trade, 5257 tons, brought November receipts up to 34,658 tons. A total of 59,556 tons of ferrous products was exported during the month, or 221 tons more than in October, according to the iron and steel division, department of commerce.

IMPORTS AND EXPORTS
Gross Tons

	——1931——		——1930——	
	Imports	Exports	Imports	Exports
Jan.	40,781	92,745	43,624	223,766
Feb.	28,045	91,212	43,326	197,225
March	40,401	109,512	56,618	238,329
April	47,872	101,081	53,686	208,604
May	37,176	91,407	54,315	195,425
June	37,819	75,585	48,953	159,273
July	37,190	84,466	39,083	131,580
Aug.	30,139	73,338	35,405	150,922
Sept.	30,966	69,768	40,285	131,045
Oct.	29,401	59,335	38,344	131,845
Nov.	34,658	59,556	43,098	111,979
11 mo.	394,448	908,005	496,737	1,879,993
Dec.	.....	.....	40,754	101,992
Total	.....	.....	537,491	1,981,985

Despite this slight gain registered by the export trade as a whole, shipments in 26 of the 46 classes of products were smaller in November than they had been in October. The greatest single loss was in exports of scrap, 7354 tons, and note must also be taken of the 1888-ton reduction in skelp shipments and that of 1249 tons in galvanized steel sheets. Successfully offsetting these were increases of 4186 tons in exports of ingots; of 1937 tons in steel bars; and of 1332 tons in frames, sashes and sheet piling.

ORIGIN OF NOVEMBER IMPORTS
Gross Tons

	Steel ingots, blooms	Steel scrap	Cast iron pipe	Steel bars
Austria	.....	.....	.....	2
Belgium	1,110	.....	73	1,905
Canada	1	933	.....	1
Czechoslov.	.....	.....	.....	13
France	467	.....	72	281
Germany	200	.....	.....	445
Sweden	42	.....	.....	292
Unit. King.	46	.....	.....	10
Total	1,816	933	145	2,949

Imports of iron ore rose to 94,125 gross tons, 45,276 tons coming from Chile, 25,532 tons from Sweden, and 17,756 tons from Soviet Russia.

Increases were registered by the November export trade in the shipments made to North and Central America and the West Indies, to South America, and to Europe.

Volume of the import trade rose sharply, by 5257 tons, in November. With 3 of the 34 classes of products showing no trade in either month there were 17 classes the trade in which increased, against 14 decreases. Chief among the increases was one of 4192 tons in pig iron, and 2897 tons in ferromanganese.

IMPORTS OF IRON AND STEEL PRODUCTS
Gross Tons

Item	Nov. 1931	Oct. 1931	Nov. 1930
Pig iron	8,805	4,413	18,292
Sponge iron	.....	.....	.....
Ferromanganese, spiegeleisen (1)	3,770	873	2,865
Ferrochrome (2)	.....	.....	.....
Ferrosilicon (3)	46	23	21
Scrap	933	1,041	1,390
Ingots, blooms	1,866	750	2,162
Concrete bars	1,597	3,411	1,492
Hollow bar, drill steel	31	117	73
Merch. steel bars	2,949	5,344	3,063
Iron slabs	.....	.....	.....
Iron bars	40	18	75
Wire rods	624	250	582
Boiler, other plate	1	2	101
Sheets, skelp	274	440	1,711
Tin plate	30	2	24
Structural shapes	3,703	6,416	4,068
Sheet piling	.....	338	287
Rails, fastenings	82	198	558
Cast pipe, fittings	145	125	841
Welded pipe	1,098	290	808
Other pipe	1,109	445	1,162
Barbed wire	2,072	513	279
Round iron	202	140	216
Flat wire, strip	39	64	37
Wire rope	177	197	198
Other wire	23	42	3
Hoops and bands	4,374	3,106	1,587
Nails, tacks, staples	369	604	711
Bolts, nuts, rivets	92	67	7
Casting, forgings	101	133	105
Total	34,658	29,401	43,098

(1) Manganese content.
(2) Chromium content.
(3) Silicon content.

DESTINATION OF NOVEMBER EXPORTS
Gross Tons

	Galv. steel sheets	Tin, terne plate	Black sheets	Steel bars
Argentina	.....	1,086	1,603	.....
Brazil	98	255	2	6
Canada	143	40	2,423	698
Cent. Amer.	161	.....	7	49
Chile	.....	255	1	2
China	95	770	273	130
Colombia	154	259	7	2
Cuba	151	132	6	14
Dutch E. Ind.	25	184	.....	.....
France	.....	.....	123	.....
Italy	.....	.....	53	.....
Japan	40	1,107	113	5
Java	.....	.....	3	.....
Mexico	221	267	151	.....
Norway	20	.....	1	.....
Panama	93	.....	5	375
Philippines	578	146	1	259
Peru	137	370	7	54
United King.	.....	.....	434	3,893
Uruguay	12	1,202	.....	.....
Venezuela	79	.....	2	18
Total	1,993	6,528	5,263	5,590

ORIGIN OF NOVEMBER IMPORTS
Gross Tons

	Iron ore	Pig iron	Manganese	Ferromanganese
Algeria	5,300	.....	.....	.....
Brit. Ind.	.....	7,148	1,040	.....
Canada	.....	1,274	.....	2,141
Chile	45,276	.....	.....	.....
Cuba	.....	.....	.....	.....
France	.....	.....	.....	22
Mexico	261	.....	.....	.....
Netherlands	.....	333	.....	.....
Norway	.....	.....	.....	1,319
Sweden	25,532	.....	.....	.....
Soviet Russia	17,756	.....	7,676	.....
United King.	.....	50	.....	288
Total	94,125	8,805	8,716	3,770

EXPORTS OF IRON AND STEEL PRODUCTS
Gross Tons

Item	Nov. 1931	Oct. 1931	Nov. 1930
Pig iron	717	456	565
Ferromanganese, spiegeleisen	2	8	51
Scrap	6,158	13,512	8,167
Ingots, blooms	4,299	113	1,166
Iron bars	48	35	91
Steel bars	5,590	3,653	3,350
Alloy steel bars	136	125	244
Wire rods	1,353	1,621	2,543
Boiler plate, not fabr.	1,407	1,845	6,743
Skelp	2,201	4,089	10,825
Iron sheets, galv.	131	210	426
Steel sheets, galv.	1,993	3,242	6,270
Steel sheets, black	5,263	4,687	11,651
Iron sheets, black	217	195	868
Hoops, bands	1,275	1,891	2,125
Tin, terneplate	6,528	6,138	13,052
Shapes, not fabr.	3,457	3,605	8,579
Shapes, plates, fabr.	506	426	4,837
Metal lath	142	168	297
Frames, sashes, sheet piling	1,385	53	1,577
Rails	2,214	888	3,339
Rail fastenings	1,240	377	1,556
Boiler tubes	335	549	900
Casing, pipe, seamless and welded	717	407	2,533
Malleable-iron screwed pipe fittings	225	241	816
Iron screwed pipe fittings	48	55	300
Iron pressure pipe, fittings	182	425	504
Iron soil pipe, fittings	105	57	983
Welded, black galv. steel pipe	5,330	4,064	4,264
Welded, black, galv. wrought pipe	262	189	445
Plain black or galv. steel wire	1,241	1,221	1,983
Barbed wire, woven fencing	1,051	1,134	2,473
Woven-wire screen cloth	49	54	81
Wire rope	74	189	227
Wire nails	618	934	781
Tacks	31	50	24
Bolts, nuts, rivets	261	328	533
Iron castings	323	274	391
Steel castings	55	157	465
Car wheels, axles	220	264	586
Forgings	641	336	555
Total	59,556	59,335	111,979

Personals

ARTHUR R. SCHULZE, formerly assistant chief engineer, Mingo works, Carnegie Steel Co., Pittsburgh, has been appointed chief engineer of the Ohio works of this company at Youngstown, O.

□ □ □

Joseph L. Fohner, formerly sales manager, Oil City Brass Works, Beaumont, Tex., is now affiliated with Southern Brass Mfg. & Plating Co., Houston, Tex., in a similar capacity.

□ □ □

William H. Waite has been appointed sales manager of the Browning Crane & Shovel Co., Cleveland. Mr. Waite was previously connected with the Browning company's New York office.

□ □ □

J. H. Fisher, a former president of the Fisher Governor Co., Marshalltown, Iowa, has been elected president by the board of directors to fill the vacancy created by the recent resignation of L. W. Browne who had been president since 1929.

□ □ □

R. D. Eaglesfield has been appointed district manager in charge of motor and welder sales at Indianapolis for Lincoln Electric Co., Cleveland. Before joining the technical sales force of the Lincoln company, Mr. Eaglesfield was a manufacturer of motor-driven machinery.

□ □ □

William J. Stubbins Jr. has joined the staff of the Ferro Enamel Corp., Cleveland. Jack Rumer, formerly located with the Ferro company's Cleveland office, recently began his duties as west coast representative of the company with headquarters at Oakland, Calif.

□ □ □

George R. Fink, president, Great Lakes Steel Corp., Ecorse, Mich., and Michigan Steel Corp., Ecorse, both subsidiaries of National Steel Corp., Pittsburgh, has been appointed a member of the executive committee of the Guardian Detroit Union Group Inc., Detroit.

□ □ □

H. B. Miller, district sales manager, Lincoln, Nebr., for Colorado Fuel & Iron Products Co., Denver, is now manager of the eastern steel sales division of the company, a newly created office, to include Kansas, Nebraska, and South Dakota. Irving H. Kulp has been made district sales manager at Lincoln.

F. L. Kemerling, formerly at Dodge City, Kans., is now in charge of a new sales territory made up of northeastern Colorado, Western Nebraska and part of South Dakota. His headquarters will be in Denver. J. P. Warner, formerly district sales manager at Wichita, Kans., will succeed Mr. Kemerling at Dodge City.

□ □ □

R. L. Suhl, for the past three years assistant to the late Frederick S. Jordan, succeeds him as manager of the nickel sales department, International Nickel Co. Inc., New York.

Ransom Cooper Jr., Walter C. Kerrigan and Charles McKnight have been appointed Mr. Suhl's assistants.

□ □ □

T. S. Hammond, Whiting Corp., Harvey, Ill., recently was appointed a brigadier general and placed in command of the 65th Infantry brigade, Illinois National Guard. Previously General Hammond held the rank of colonel in command of the 124th Field Artillery, Illinois National Guard. He has been active in military work since 1915.

□ □ □

Clarence E. Searle, general representative of the Allis-Chalmers Mfg. Co., Milwaukee, has resigned, effective Jan. 31. Mr. Searle has been associated with the company for 24 years, and for the last 18 years has directed its entire sales activities. He will be succeeded as general representative by L. W. Grothaus, now assistant manager of the electrical department.

□ □ □

Glen F. Hawkey has been elected vice president of the Cleveland Duplex Machinery Co. Inc. He has been associated with the company for 14 years.

R. H. Ball is now affiliated with the Cleveland Duplex company as sales engineer. For a number of years Mr Ball was connected with Warner & Swasey Co., Cleveland, in the Michigan and northeastern Ohio teritories.

□ □ □

Willis C. Brown, formerly president, Spartan Aircraft Co., Tulsa, Okla., and for the past two years identified with aviation manufacturing interests at Detroit, has returned to Tulsa as sales representative for a number of manufacturers of machinery and power plant equipment, including A. W. Cash Co., Decatur, Ill.; Armstrong Machine Works, Three Rivers, Mich.; Continental Motors Corp., Muskegon, Mich.; Hobart Bros. Co., Troy, O. He will have exclusive distribution for these companies in Kansas, Oklahoma and Texas.

□ □ □

C. B. Crockett and R. L. Smith have been appointed eastern general sales agents for Automatic Transportation Co. Inc., Buffalo. Centralized sales and engineering headquarters will be maintained in New York with district offices at Boston, Philadelphia, Baltimore, Buffalo, Hartford, Conn., Newark, N. J., Washington and Charlotte, N. C. Both Mr. Crockett and Mr. Smith have had wide experience in the materials handling and industrial truck field, the former having been executive secretary of the Industrial Truck association since its formation, while Mr. Smith was affiliated with Elwell-Parker Electric Co., Cleveland, for over ten years.

Obituaries

HENRY H. BARBOUR, 70, of New York, prominent in the iron and steel industry, died in Philadelphia, Dec. 28. He was formerly vice president in charge of sales of the Lackawanna Steel Co., Buffalo, until the company's merger with the Bethlehem Steel Co., Bethlehem, Pa., and later was vice president of the Consolidated Steel Co., New York. During the war he served on the War Industries board, Washington, and was chairman of one of its committees. Prior to his affiliation with the Lackawanna Steel Co. he was with the Carnegie Steel Co., Pittsburgh.

□ □ □

Scott H. Penfield, 68, former president of the Salisbury Axle Mfg. Co., died recently at Jamestown, N. Y.

□ □ □

Thomas Wren, 94, a retired foundry superintendent of Peekskill, N. Y., died Dec. 22.

□ □ □

John Woltman, 72, a department superintendent of the American Gas Furnace Co., Elizabeth, N. J., for more than 30 years, died in that city, Dec. 21.

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K. E. Kindregan, president of K. E. Kindregan & Co., New York, iron and steel brokers, was killed recently when hit by a train at a railroad station at Westfield, N. J., where he resided.

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William A. Young, 61, for 20 years associated with the Harnischfeger Corp., Milwaukee, as chief and consulting engineer, died Dec. 23. Funeral services were held at his former home in Cuyahoga Falls, O.

□ □ □

Elwyn W. Lovejoy, 81, for many years prominent as a manufacturer of machine knives, died at Lowell, Mass., Dec. 26. He had been affiliated with D. Lovejoy & Sons Co., Lowell, and Anderson Knife & Bar Co., Anderson, Ind.

□ □ □

Philip A. Weiting, 74, affiliated with Colorado Fuel & Iron Co., Denver and Pueblo, Colo., for 36 years until his retirement as assistant treasurer in 1929, died at Pueblo, Dec. 23. He was a native of Middletown, N. Y.

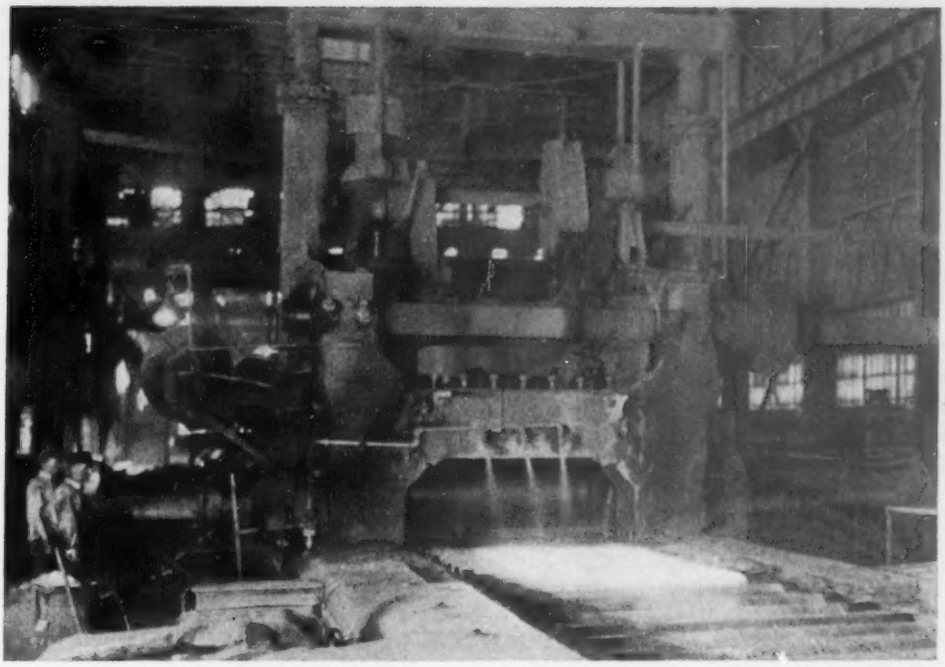

Plate mills would have been more active in 1931 if it had not been for the sharp decline in railroad purchasing, oil production, and world shipping

Domestic Market Trends in 1931 Reviewed

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Reports Prepared by Staff Correspondents

E. C. KREUTZBERG	New York	B. K. PRICE	New York
F. B. PLETCHER	Chicago	L. E. BROWNE	New York
W. G. GUDE	Pittsburgh	C. G. STEWART	New York
E. A. FRANCE JR.	Cleveland	F. S. TOBIN	Toronto

Domestic Iron and Steel Prices in 1931

Average Monthly Prices of Leading Materials at Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
PIG IRON												
Bessemer	$18.76	$18.51	$18.26	$18.26	$18.26	$18.26	$18.26	$18.26	$18.26	$18.16	$17.76	$17.51
Basic	18.13	17.88	17.88	18.13	18.13	18.13	18.13	18.13	18.13	17.63	16.13	16.13
Foundry No. 2	18.26	18.01	18.01	18.26	18.26	18.26	18.26	18.26	18.26	18.16	17.76	17.51
Malleable	18.63	18.38	18.13	18.13	18.13	18.13	18.13	18.13	18.13	18.03	17.63	17.48
Gray Forge	17.63	17.38	17.38	17.63	17.63	17.63	17.63	17.63	17.63	17.53	17.13	17.88
Bessemer Ferrosilicon, 10 per cent (Jackson county base)	25.00	25.00	25.00	25.00	25.00	25.00	25.00	24.00	23.00	23.00	23.00	23.00
SEMIFINISHED												
Billets, Bessemer	$30.00	$30.00	$30.00	$30.00	$30.00	$29.00	$29.00	$29.00	$29.00	$29.00	$29.00	$29.00
Billets, Open Hearth	30.00	30.00	30.00	30.00	30.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00
Sheet Bars, Bessemer	30.00	30.00	30.00	30.00	29.75	29.00	29.00	29.00	29.00	29.00	29.00	28.50
Sheet Bars, Open Hearth	30.00	30.00	30.00	30.00	29.75	29.00	29.00	29.00	29.00	29.00	29.00	28.50
Wire Rods	35.00	35.00	36.00	36.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
COKE												
Furnace, Spot	$2.50	$2.50	$2.50	$2.50	$2.45	$2.40	$2.40	$2.40	$2.40	$2.40	$2.35	$2.30
Foundry, Spot	3.30	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	2.25
ROLLED PRODUCTS												
Structural Shapes	1.60c	1.60c	1.60c	1.65c	1.65c	1.65c	1.60c	1.60c	1.60c	1.60c	1.60c	1.50c
Plates, base	1.65	1.65	1.65	1.65	1.65	1.65	1.60	1.60	1.60	1.60	1.60	1.50
Steel Bars, base	1.65	1.65	1.65	1.65	1.65	1.65	1.60	1.60	1.60	1.60	1.60	1.60
Cold Finished Steel Bars	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.00
Strip, Hot Rolled—												
To 6 inches wide	1.65	1.65	1.65	1.65	1.60	1.60	1.65	1.65	1.65	1.65	1.60	1.55
6⅛ to 24 inches	1.55	1.55	1.55	1.55	1.50	1.50	1.55	1.55	1.55	1.55	1.50	1.45
Strip, Cold Rolled, base	2.25	2.25	2.25	2.20	2.15	2.15	2.15	2.15	2.15	2.15	2.10	2.05
Steel Pipe, 1 to 3-in. discount	64%	64%	64%	64%	64%	64%	64%	64%	64%	64%	64%	64%
Standard Spikes, base	2.80	2.80	2.80	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.65
Wire Nails, base	1.90	1.90	1.90	1.90	1.90	1.80	1.85	1.90	1.90	1.90	1.90	1.90
Plain Wire, base	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
Structural Rivets, base	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.55	2.30	2.25	2.25
No. 24 Hot Rolled Annealed Sheets	2.35	2.35	2.35	2.25	2.25	2.15	2.40	2.40	2.40	2.40	2.40	2.40
No. 9-10 Blue Annealed	1.90	1.90	1.90	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85
No. 24 Galvanized	2.90	2.90	2.90	2.85	2.80	2.80	2.90	2.90	2.90	2.90	2.90	2.90
Tin Plate, base box	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00	$4.75	$4.75	$4.75
OLD MATERIAL												
Heavy Melting Steel	$13.00	$12.75	$12.90	$12.50	$11.25	$10.30	$10.50	$10.70	$10.80	$10.45	$10.25	$10.00
Low Phosphorus	17.20	17.50	17.50	17.20	16.25	14.75	13.50	13.50	14.00	14.00	14.00	14.00
No. 1 Cast	12.50	12.50	12.50	12.20	11.50	10.85	10.00	10.00	10.00	10.00	10.00	10.00

Average Monthly Prices of Leading Materials at Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
PIG IRON												
Lake Superior Charcoal	$27.04	$27.04	$27.04	$27.04	$27.04	$27.04	$27.04	$27.04	$25.54	$25.04	$25.04	$20.04
Northern No. 2 Foundry	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.20	17.00	16.60
Southern No. 2 Foundry	17.01	16.81	16.76	17.01	17.01	17.01	17.01	17.01	17.01	17.01	17.01	17.01
Malleable	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.10	17.00	16.60
ROLLED PRODUCTS												
Bar Iron	1.70c	1.75c	1.70c	1.80c	1.80c	1.70c	1.70c	1.70c	1.70c	1.70c	1.65c	1.60c
Rail Steel Bars	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.50	1.50	1.50
Soft Steel Bars	1.70	1.70	1.70	1.80	1.75	1.70	1.70	1.70	1.70	1.70	1.70	1.60
Structural Shapes	1.70	1.70	1.70	1.80	1.75	1.70	1.70	1.70	1.70	1.70	1.70	1.60
Plates	1.70	1.70	1.70	1.80	1.75	1.70	1.70	1.70	1.70	1.70	1.70	1.60
No. 24 Hot Annealed Sheets	2.50	2.50	2.50	2.45	2.40	2.40	2.55	2.55	2.55	2.55	2.55	2.55
OLD MATERIAL												
Heavy Melting Steel	$10.00	$9.85	$9.75	$9.60	$8.65	$8.50	$8.50	$8.25	$7.95	$7.75	$7.65	$7.50
No. 1 Railroad Wrought	9.50	9.25	9.00	8.80	8.40	8.25	8.25	8.25	8.00	8.00	8.00	7.45
Rails for Rolling	13.00	12.10	12.00	11.85	11.15	10.90	10.50	10.50	10.50	10.50	10.00	9.80
Car Wheels, Iron	11.25	10.75	10.60	9.50	9.25	10.20	10.00	9.90	9.50	9.50	9.00	8.75
No. 1 Cast (Machinery)	10.65	10.65	10.65	10.25	9.80	9.80	9.80	9.80	9.80	9.80	9.00	8.95

Average Monthly Prices of Leading Materials in Eastern Pennsylvania

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
PIG IRON												
Basic, Eastern Pennsylvania	$17.25	$17.25	$17.25	$17.25	$17.00	$17.00	$16.75	$16.75	$16.65	$16.35	$16.00	$16.00
No. 2X Foundry, Philadelphia	18.26	18.26	18.26	18.26	17.76	17.76	17.76	17.51	17.26	17.26	16.01	15.76
No. 2X Virginia, furnace	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.00	18.00	18.00	18.00
Standard Low Phosphorus, Philadelphia	22.50	22.50	22.50	22.50	22.50	22.50	22.50	22.00	21.50	21.50	21.10	21.50
ROLLED PRODUCTS												
Tank Plates, base, Philadelphia	1.805c	1.805c	1.805c	1.855c	1.855c	1.855c	1.805c	1.805c	1.805c	1.805c	1.735c	1.735c
Structural Shapes, base, Philadelphia	1.81	1.81	1.81	1.78	1.76	1.76	1.76	1.76	1.76	1.76	1.695	1.695
Steel Bars, base, Philadelphia	1.94	1.94	1.94	1.96	1.94	1.94	1.89	1.89	1.89	1.89	1.89	1.89
Bar Iron, common, base, Philadelphia	1.99	1.89	1.89	1.89	1.89	1.89	1.89	1.89	1.89	1.89	1.89	1.84
No. 10 Blue Annealed, Philadelphia	2.19	2.19	2.19	2.16	2.14	2.09	2.14	2.14	2.14	2.14	2.14	2.14
Billets, Open Hearth, Philadelphia	$35.30	$35.30	$35.30	$35.30	$34.80	$34.80	$34.80	$34.80	$34.80	$34.80	$34.80	$34.30
OLD MATERIAL												
No. 1 Heavy Melting Steel, Philadelphia	$10.50	$10.50	$10.50	$10.00	$9.50	$8.75	$8.25	$8.55	$8.75	$8.20	$7.95	$7.50
No. 1 Railroad Wrought, Philadelphia	13.25	12.50	11.00	11.00	11.00	10.50	10.00	9.75	9.75	9.50	9.50	9.50
No. 1 Cupola Cast, Philadelphia	12.75	12.75	13.00	13.00	12.75	12.50	12.50	12.50	12.75	12.75	11.50	11.50

Economic Pressure in 1931 Pushes Steel Markets to Elastic Limit

BY E. C. BARRINGER
Associate Editor, STEEL

DEPRESSION beat down upon the iron and steel industry with unparalleled ferocity in 1931. Under its lash, production surrendered all gains since 1921 and, when related to capacity, sank to the lowest level in modern times. Prices broke through 1921 resistance points. Earnings vanished—for the first 9 months averaging considerably less than 1 per cent—carrying with them dividends of most producers. Salaries, bonuses and wages bent before the storm.

Previously, 1930 had been appraised as a year of liquidation following 1929's excesses, but as 1931 wore on appeared in retrospect a comparatively flourishing and calm period. Such a disheartening condition, which was glossed over in the first half year but discussed with utter frankness in the second, followed as a direct consequence of a paralysis of some purchasing power and hurtful hoarding of much of the remainder.

Only the building industry of the four major outlets for steel made a reasonably good showing, but even this measure of comfort was vitiated by the preponderance of large awards. For the Rockefeller Radio City project in New York 125,000 tons was ordered; for the Pennsylvania railroad eastern electrification, 100,000 tons. Competition for these and other noteworthy jobs, in the absence of a normal run of medium and small projects, heightened competition and obliterated profits. In 51 weeks of 1931 structural awards as compiled by STEEL totaled 1,734,743 tons; in all 1930, 1,832,601 tons.

Transportation Needs for Steel Ebb

The railroads, in deep financial waters, found themselves over-equipped, a situation epitomized by the purchase of only 9833 freight cars in 11 months, compared with 45,146 in all 1930 and 106,105 in 1929. Automobile production, estimated at 2,365,000 units, contrasted with 3,063,531 in 1930 and 5,358,420 in record 1929, also receded to a new modern low; in fact, some authorities estimate more cars were retired than made in 1931. Pipe business, both steel and iron, was only a shadow of 1930 and 1929.

For understandable operating reasons producers of pig iron were slow to blow out their stacks, although by Nov. 30 only 67 out of 302 potential stacks were active. Meanwhile, stocks of pig iron exceeded 1,500,000 tons. But steel ingot output was synchronized with demand, and afforded an accurate gage of the trend of production. Nineteen thirty one opened reasonably encouraging and by easy stages the steelmaking rate climbed from 33 per cent to almost 60 by late March. A rear guard action followed, which was not arrested until production dipped to 27 per cent in late October.

Then, as a number of trustworthy business indicators became favorable and security prices began to rise, the steel rate recovered, but by late November its powers of recuperation were exhausted, it could not cross 31 per cent, and soon ebbed to a new low for the year. With December estimated, output of open-hearth and bessemer steel ingots in 1931 was 24,928,000 gross tons, compared with 39,286,287 in 1930 and 55,474,359 in peak 1929. Coke pig iron output in 1931, also with December estimated, was 18,383,000 tons, against 31,441,488 tons in 1930 and 42,270,183 tons in record 1929.

Market Practice Little Changed

Market practice in 1931 adhered to the orthodox, with the possible exception of the introduction of a new classification of sheets which takes cognizance of the continuous mill. For the first time in history, foreign iron ore other than special grades penetrated Lake Erie, but the enlarged Welland canal also made the obverse true and Lake Superior ore passed more freely to Lake Ontario. The reduction of the common labor wage rate Oct. 1 was a major development. Class freight rates were revised, chiefly upward, as of Dec. 3, while at the year's end practically all raw material and iron and steel rates were in process of advance to afford temporary financial relief to the railroads.

Having regarded 1930 as a year of liquidation only to experience even more drastic adjustment in 1931, iron and steel producers became chary of prognostication. But if 1931 in many respects patterned after 1921, mild hope was aroused that 1932 might view the moderate recovery of 1922 as a precedent. Majority opinion was that the first half of 1932 would be slow, with a gentle tendency toward improvement in the last half, with any upset possible on account of the presidential year.

Composite Market Record

Compiled by STEEL (Iron Trade Review prior to July 1, 1930)

Monthly Averages of Fourteen Iron and Steel Products, 1920-1927

1920	
January	$59.40
February	65.63
March	65.47
April	67.49
May	68.26
June	67.89
July	68.29
August	68.93
September	69.28
October	68.61
November	63.75
December	54.04
Average for year	65.59

1921	
January	51.98
February	48.81
March	45.37
April	43.84
May	43.32
June	41.87
July	38.14
August	35.99
September	$35.34
October	35.46
November	34.71
December	33.99
Average for year	40.74

1922	
January	33.35
February	32.86
March	32.97
April	34.42
May	36.49
June	36.96
July	37.50
August	39.79
September	43.79
October	43.60
November	42.08
December	40.53
Average for year	37.86

1923	
January	41.17
February	42.61
March	$45.31
April	47.01
May	47.52
June	46.46
July	45.39
August	44.87
September	44.64
October	43.84
November	42.81
December	43.02
Average for year	44.55

1924	
January	43.26
February	43.49
March	43.24
April	42.33
May	41.38
June	40.61
July	39.78
August	39.33
September	39.05
October	38.65
November	39.00
December	$40.21
Average for year	40.86

1925	
January	41.02
February	41.13
March	40.70
April	39.45
May	38.37
June	37.60
July	37.45
August	37.39
September	37.35
October	37.61
November	38.73
December	39.14
Average for year	38.83

1926	
January	39.17
February	38.95
March	38.88
April	38.48
May	$38.22
June	37.69
July	37.68
August	37.61
September	37.76
October	38.08
November	38.43
December	38.22
Average for year	38.26

1927	
January	37.68
February	36.97
March	36.83
April	36.73
May	36.76
June	36.59
July	36.41
August	36.25
September	36.18
October	35.67
November	35.35
December	35.09
Average for year	36.37

Weekly and Monthly Averages, 1928-1931

1928	
Jan. 4	$35.07
Jan. 11	35.23
Jan. 18	35.33
Jan. 25	35.45
Average for January	35.27
Feb. 1	35.45
Feb. 8	35.61
Feb. 15	35.61
Feb. 22	35.61
Feb. 29	35.83
Average for February	35.62
Mar. 7	35.91
Mar. 14	35.91
Mar. 21	35.70
Mar. 28	35.71
Average for March	35.81
April 4	35.77
April 11	35.77
April 18	35.56
April 25	35.56
Average for April	35.67
May 2	35.56
May 9	35.57
May 16	35.53
May 23	35.53
May 30	35.50
Average for May	35.54
June 6	35.46
June 13	35.48
June 20	35.20
June 27	35.05
Average for June	35.30
July 4	34.93
July 11	34.85
July 18	34.89
July 25	34.97
Average for July	34.91
Aug. 1	34.93
Aug. 8	34.89
Aug. 15	34.89
Aug. 22	35.01
Aug. 29	35.10
Average for August	34.96
Sept. 5	35.11
Sept. 12	35.13
Sept. 19	35.23
Sept. 26	35.29
Average for September	35.19
Oct. 3	35.30
Oct. 10	35.42
Oct. 17	35.57
Oct. 24	35.63
Oct. 31	35.73
Average for October	35.53
Nov. 7	35.81
Nov. 14	35.93
Nov. 21	36.19
Nov. 28	36.13
Average for November	36.02
Dec. 5	36.16
Dec. 12	36.24
Dec. 19	36.24
Dec. 26	36.24
Average for December	36.22
Average for year	35.50

1929	
Jan. 2	$36.25
Jan. 9	36.23
Jan. 16	36.23
Jan. 23	36.25
Jan. 30	36.25
Average for January	36.24
Feb. 6	36.25
Feb. 13	36.25
Feb. 20	36.25
Feb. 27	36.37
Average for February	36.28
Mar. 6	36.37
Mar. 13	36.37
Mar. 20	36.37
Mar. 27	36.57
Average for March	36.42
Apr. 3	36.57
Apr. 10	36.81
Apr. 17	36.82
Apr. 24	37.04
Average for April	36.81
May 1	37.07
May 8	37.07
May 15	37.13
May 22	37.13
May 29	37.10
Average for May	37.10
June 5	37.07
June 12	37.07
June 19	36.96
June 26	36.84
Average for June	36.99
July 3	36.76
July 10	36.72
July 17	36.72
July 24	36.68
July 31	36.68
Average for July	36.71
Aug. 7	36.60
Aug. 14	36.52
Aug. 21	36.52
Aug. 28	36.52
Average for August	36.54
Sept. 4	36.52
Sept. 11	36.52
Sept. 18	36.52
Sept. 25	36.44
Average for September	36.50
Oct. 2	36.36
Oct. 9	36.32
Oct. 16	36.24
Oct. 23	36.16
Oct. 30	36.09
Average for October	36.23
Nov. 6	36.09
Nov. 13	36.09
Nov. 20	35.97
Nov. 27	35.97
Average for November	36.03
Dec. 4	35.97
Dec. 11	35.95
Dec. 18	35.97
Dec. 25	35.89
Average for December	35.95
Average for year	36.48

1930	
Jan. 1	$35.88
Jan. 8	35.72
Jan. 15	35.60
Jan. 22	35.36
Jan. 29	35.24
Average for January	35.56
Feb. 5	35.24
Feb. 12	35.24
Feb. 19	35.24
Feb. 26	35.24
Average for February	35.24
Mar. 5	35.12
Mar. 12	34.94
Mar. 19	34.89
Mar. 26	34.85
Average for March	34.95
Apr. 2	34.57
Apr. 9	34.52
Apr. 16	34.44
Apr. 23	34.40
Apr. 30	34.28
Average for April	34.44
May 7	33.96
May 14	33.84
May 21	33.56
May 28	33.56
Average for May	33.73
June 4	33.64
June 11	33.52
June 18	33.52
June 25	33.44
Average for June	33.53
July 2	33.34
July 9	33.32
July 16	33.18
July 23	33.14
July 30	33.09
Average for July	33.21
Aug. 6	33.08
Aug. 13	33.00
Aug. 20	33.00
Aug. 27	32.88
Average for August	32.99
Sept. 3	32.78
Sept. 10	32.68
Sept. 17	32.64
Sept. 24	32.56
Average for September	32.65
Oct. 1	32.52
Oct. 8	32.32
Oct. 15	32.24
Oct. 22	32.14
Oct. 29	32.06
Average for October	32.26
Nov. 5	31.98
Nov. 12	31.98
Nov. 19	31.86
Nov. 26	31.86
Average for November	31.92
Dec. 3	31.84
Dec. 10	31.84
Dec. 17	31.68
Dec. 24	31.66
Dec. 31	31.66
Average for December	31.74
Average for year	33.52

1931	
Jan. 7	$31.66
Jan. 14	31.73
Jan. 21	31.73
Jan. 28	31.73
Average for January	31.71
Feb. 4	31.69
Feb. 11	31.69
Feb. 18	31.61
Feb. 25	31.61
Average for February	31.65
Mar. 4	31.61
Mar. 11	31.61
Mar. 18	31.71
Mar. 25	31.71
Average for March	31.66
April 1	31.67
April 8	31.67
April 15	31.59
April 22	31.51
April 29	31.49
Average for April	31.59
May 6	31.40
May 13	31.37
May 20	31.37
May 27	31.33
Average for May	31.37
June 3	31.03
June 10	31.03
June 17	31.03
June 24	30.99
Average for June	31.02
July 1	31.11
July 8	31.11
July 15	30.98
July 22	30.98
July 29	31.06
Average for July	31.05
Aug. 5	31.06
Aug. 12	31.06
Aug. 19	31.04
Aug. 26	31.04
Average for August	31.05
Sept. 2	31.04
Sept. 9	31.04
Sept. 16	31.03
Sept. 23	31.02
Sept. 30	31.02
Average for September	31.03
Oct. 3	30.82
Oct. 10	30.78
Oct. 17	30.76
Oct. 24	30.68
Oct. 31	30.64
Average for October	30.74
Nov. 7	30.63
Nov. 14	30.63
Nov. 21	30.63
Nov. 28	30.55
Average for November	30.61
Dec. 7	30.47
Dec. 12	30.36
Dec. 19	30.28

Record Structural Awards Intensify 1931 Competition

MARKET for structural steel in 1931, like that for other finished material, was far from satisfactory, yet it had more redeeming qualities than most of them. Never in history did fabricators book such large individual tonnages, and up to the final weeks of the year weekly awards as compiled by STEEL ran almost a dead heat with 1930.

The 125,000 tons for the Radio City project in New York was the largest structural award in history. For its eastern electrification program the Pennsylvania railroad placed 100,000 tons. Other jobs, each exceeding 45,000 tons, included the Chicago postoffice, New Orleans Belt Line bridge and the Golden Gate bridge, the latter complicated by a legal technicality.

Severest Competition Met

Prices suffered from the most severe competition ever experienced by fabricators, due in part to the preponderence of large projects and a corresponding lack of small and medium size ones. Since public work constituted a large portion of 1931 awards, it is doubtful whether business actually was stimulated. This extreme competitive situation led to the proposal of a rationalization plan by the American Institute of Steel Construction, which still is under advisement. Not unlike the European cartels in some respects, capacities of fabricators would be ascertained and certain quotas set to insure a fair distribution of work.

New alignments in the fabricating field followed from the absorption by the Bethlehem Steel Co. of the McClintic-Marshall Corp. in February and the Hedden Iron Construction Co., Hay Foundry & Iron Works and Levering & Garrigues Co. in April. An important step toward standardization and elimination of multiplicity of sections was taken by the United States Steel Corp. and the Bethlehem Steel Co.

Private Awards Are Small

Tonnage in the East suffered severely because of failure of the New York subway program, which took 200,000 tons in 1930, to go forward. The northern New Jersey viaduct, a new approach to the Holland vehicular tunnel, required almost 60,000 tons. Private construction in the East, in the main, consisted of jobs ranging between 100 and 200 tons.

In the Pittsburgh district from the mill standpoint there was little unusual in the shape market. Placing of several large orders offset quietness in smaller awards. Activity in industrial construction was slow, while bridge work and other public awards predominated.

At Chicago over 125,000 tons was rolled for state highway, railroad bridge and track elimination work. No small item in Chicago market activity was steel for expansion of the Illinois Steel Co. and Inland Steel Co.

Harbor work at Chicago was outstanding, in which steel piling for seawalls and bulkheads, produced for the first time by a western mill, became active. This piling, constructed largely of channels and angles, including about 15,000 tons for Chicago and Milwaukee harbor developments. A Chicago super-highway project, 80,000 tons, was deferred until 1932, and court procedure postponed indefinitely 150,000 to 200,000 tons for the Chicago subways. About 5000 tons were let for the 1933 Century of Progress exposition in Chicago.

Controversy over the Illinois prevailing wage rate law, which finally was declared unconstitutional, deferred a large part of 70 road, bridge and waterway projects, totaling $34,000,000 until 1932. Relatively more carbon steel bars were used in structural work. Steel frame dwelling houses increased in the larger cities.

Several hundred postoffice and federal building projects, largely the result of stimulus afforded by various committees at Washington, were awarded. About 40 of them were in the North Central states, the largest being the Chicago postoffice, requiring 48,200 tons.

About 6000 tons of shape work was before fabricators for Cleveland in early January, with 25,000 to 30,000 tons in the projected stage. At the beginning of the year a base of 1.65c, Pittsburgh, was attempted, but customers were permitted to contract up to Dec. 31, 1930, on the basis of 1.60c, and then order out at their convenience. In February structural possibilities began early to dwindle with award of the Otis Steel, General Electric and Higbee jobs. For a number of airplane hangars, bids were taken.

New Uses Are Devised

Progress was made in 1931 in the application of shapes to stairway construction and, in combination with plates, in battledeck floor construction. A Milwaukee manufacturer utilized hollow columns and hollow type girders in a new research and engineering building, providing space for piping and ventilating requirements.

The price of plain material during 1931 was typified by the situation at Pittsburgh. Plain shapes opened the year at 1.60c, in April were advanced $1 to 1.65c, eased off to 1.60c in July, and late in November declined to 1.50c. For genuinely attractive projects, sharp concessions under these levels were made.

Tin Plate Holds Within 25 Per Cent Of Production in 1930; Price Yields

ACTIVITY in tin plate was considerably better than in practically any other steel product last year, adding somewhat to the tin plate's reputation as a "depression-proof" industry. Output for the year was 20 to 25 per cent under 1930.

Tin plate consumption for fabrication of food containers declined to a relatively greater extent than that for manufacture of general line cans. Packing of fruits, particularly the more expensive grades, was quieter than in 1930 while several vegetable crops also were reduced materially. The packs of peas and tomatoes were more than 40 per cent less than in 1930, and although the corn pack showed little change the total for the three was more than 20 per cent under the 54,650,000 cases for 1930.

Export business was dull, the volume varying from only one-half to one-third that for the corresponding 1930 months. In general line cans, containers for paint, varnish and oil felt the effects of the general depression, but tobacco, pharmaceutical goods and miscellaneous outlets remained active.

Tin mill operations moved with the seasonal trend, spring months witnessing the largest production, with schedules declining to about 40 per cent in fourth quarter.

The price of tin plate declined to the lowest level since 1923 when a reduction of 25 cents per box Oct. 1 brought the market to $4.75, Pittsburgh, from the $5 level prevailing since Oct. 1, 1930. This equalled the lowest post-war quotation, which was in effect from late 1921 to early 1923. Long ternes dropped $6 a ton during the year to 3.15c for the unassorted grade.

Plate Sales Shrink as Many Outlets Diminish Activity

PLATE consumption in 1931 reached the lowest mark in years. Particularly was it affected by the sharp declines in car and locomotive building, shipbuilding and line pipe construction. Of the other major outlets for plates, building construction probably held up the best but by the end of the year it was sagging badly.

Reflecting this condition, plate mill operations eased off from a high of around 60 per cent in the spring to less than 30 at the close. Relatively, prices were steady. Opening the year at 1.60c, Pittsburgh, plate prices on the general run of tonnage advanced $1 a ton in January, holding until July, when 1.60c again prevailed. This figure eased off to a spread of 1.50c to 1.60c, Pittsburgh, as the year ended. A similar trend prevailed at Chicago and at Coatesville, Pa., the eastern basing point.

Railroad Buying Lacking

Of the principal consuming groups, the railroads were far and away the least active. Domestic freight car buying scarcely exceeded 10,000 cars, if it reached that number, against 45,000 cars in 1930 and 106,000 in 1929. Locomotive buying was relatively as poor, if not worse. Few more than 225 locomotives were placed, and of this number 150 were for one railroad, the Pennsylvania.

Line pipe tonnage was fair, although a number of the larger lines took seamless pipe, which provided no outlet for plates. Two of the larger plate pipe jobs were in California and involved 60,000 tons. Storage refinery tanks, which in recent years consumed 150,000 tons and more annually, took less than half. Stoppage of oil production in Oklahoma and Texas, prorating policies of oil production, and difficulties of financing needed projects by smaller refineries had an adverse effect.

Incidentally, in the West, a number of refineries negotiated directly with plate mills for tank building credits, urging the acceptance of oil to be stored in the proposed tanks as collateral, but the low price of oil most of the year precluded the consummation of terms.

Relatively, barge construction was a feature of shipbuilding activities. At Pittsburgh, 47,000 tons of plates and shapes went into river barges, against 22,000 in 1930 and 58,000 in 1929, and a fair tonnage for this purpose was consumed along the Atlantic seaboard, in welded construction. There, some 20,000 tons or so of new naval construction and a somewhat, although not particularly larger amount for coastwise vessels contracted for in 1931, made for a fair semblance of activity at some yards. As was the case the latter part of the preceding year, delay attended much of such shipwork as was awarded.

While there was a general falling off in practically all lines, the ratio of specialty work, involving plates of special analyses, gage and rolling, continued greater. Welding continued to open new channels for plate producers, in the machine tool field and elsewhere, and notwithstanding the general dullness of conditions, there was a further refinement of processing and some notable instances of expansion. At South Chicago capacity was increased by the addition of a 96-inch continuous wide flange beam mill, while at Indiana Harbor a continuous strip-plate mill was being added, which will produce 300,000 to 400,000 annually.

Failure of fall business to develop in any proportions was a distinct disappointment to producers, particularly in the Cleveland district, where inquiry by mid-October had reached exceptional proportions. Much of this, however, was carried over into this year, with some, of course, indefinitely withdrawn. Here, in particular, the work ran largely to specialty items, as flanged and dished heads, special refinery work and similar lines.

Rail Buying Lowest Since That of 1885

RAIL buying in 1931 was possibly the poorest since at least 1885 when 963,000 tons were placed and, according to some well-informed interests, the record will likely go back further than that, when the final total is made. On this assumption, rail buying will have fallen off fully 50 per cent from 1930, when 1,834,933 tons of open-hearth rails was produced.

Some larger railroads not only failed to come into the market for any important tonnage, but failed to fully exercise their options on 1930 contracts. For instance, at Chicago, where approximately 900,000 tons of rails were placed in 1930, less than 60 per cent was ordered out in 1931.

Rais continued at $43, Pittsburgh, for standard rails and $34 for light rails. Buying of light rails was fully as disappointing as of the standard sections, due particularly to lack of mine purchases. Railroad spikes dropped from 2.80c, Pittsburgh, to 2.70c, in April, track bolts were unchanged at 3.80c, Pittsburgh, and tie plates at $39, Pittsburgh.

Wire Pricing System Is Altered; 1931 Brings Only Light Spot Buying

WIRE products encountered another year of losses from light automobile production, poor farm buying power, a variable copper market, and an over-capacited nail industry. Prices, however, held to a more stable level, following the drastic cuts in 1930, which carried nails down $10 a ton.

Maximum wire mill operations were about 40 per cent, against 50 per cent in 1930, but the 1931 average was only about 28 per cent. The low point in shipments came in July.

Jobbers specified freely against contracts late in third quarter, because of a scheduled price advance, and this reduced buying in the fourth quarter. Wire mesh for concrete road surfacing in several states reached a peak. Road consumption fell off in several eastern states, but in the Northwest and in several southern states, legislation specified this material for the first time. Orders for merchant products invariably specified quick delivery.

Jobbers and dealers carried small stocks and few wire fabricators ordered ahead. Thus the mills carried the inventory burden.

Elimination of a number of preferred buyers helped to impart a steadier price tone than during the preceding two years. Nails held at $1.90 until the end of second quarter, when the price moved to $1.80. Horizontal advances of $2 a ton on all wire products except fencing and bale ties were attempted at the beginning of the third quarter, but were only partially established. Plain manufacturers' wire continued at 2.20c most of the year, a $2 advance

at the end of first quarter failing to become generally established.

For first quarter, 1932, advances of $1 a ton on several merchant products and a new system of merchandising, eliminating the $2 differential between jobbers' and dealers' orders, were announced. A straight carload price was introduced with differentials for mixed, joint, pool and less-carloads. Nails and barbed wire were advanced $1, staples $3 and wire rods $2.

Mills changed the differentials formerly applying on annealed fence wire and galvanized wire over nails. Early in the year the two were placed on a plain wire base instead of a wire nails base, the net result being an advance of $6 a ton for annealed fencing and galvanized wire.

Despite the fact that in the Mississippi valley territory, the Northwest and parts of the South, woven fencing work had backed up for two years, little was brought to the surface in the 1931 buying seasons, and sales were below expectations of most sellers.

Two cargoes of Belgian wire products were shipped by boat direct from Antwerp to mail order distributors at Chicago. The first cargo carried 700 tons of barbed and miscellaneous wire products, and the second 2000 coils of galvanized netting and 10,000 reels of barbed wire. This marked a new trend in water shipment of wire products for inland distribution. Exports of wire products were negligible.

Bar Production Cut Sharply; Decline in Price Is Small

MOST of the hardships of 1930, with a loss in production of 35 to 38 per cent from that year, were encountered in the marketing of bar mill products in 1931, but price liquidation was much less drastic than in 1930, when carbon steel bars declined $6 a ton and cold-finished bars $4 a ton.

At no time in 1931 did bar mills have backlogs, and orders were seldom attractive enough to tempt concessions. To these factors is attributed largely the fact that bar prices yielded less than in the preceding year of depressed buying.

Buying followed a course similar to 1930. Short-term orders, variable demand, frequent roll changes for numerous odd-lot orders and mounting overhead predominated. In the West the normally major consuming groups, farm equipment, tractors and automotive, were partially superseded by road building and excavating equipment demand and deformed bar orders. The latter, while below 1930, approximated 1927 and 1928.

A gradual rise in orders for merchant and alloy bars occurred in the first quarter, passing its peak early in April, and thence the decline in specifications was virtually uninterrupted until a mild short upturn at mid-September. In March and early April most bar mills experienced the best specifications since May, 1930.

Average operations of merchant mills was 36 to 39 per cent. Alloy bar production averaged 38 per cent. Bar mills rolling products from steel rails maintained a 51 per cent average. In 1930 bar mill production was slightly above 65 per cent. In all districts, the failure of automotive production to attain schedules for which bar mills had been geared in recent years left wide gaps.

Early in the year merchant bar prices were 1.60c, Pittsburgh, and advanced to 1.65c in the first quarter. This price was only partially maintained until the opening of third quarter, when 1.60c was re-established. At Chicago, the usual $2 differential over Pittsburgh prevailed early in the year, but the spread narrowed to only $1 for part of the year.

Reinforcing Bars Decline

Deformed bar prices, billet grade, declined from 1.90c to 1.60c in the East and went as low as 1.55c in the West. Rail steel bars dropped from 1.65c to 1.30c. The competition of rail steel bars became so severe at times that mills talked of repossession of old rails.

A base on merchant bars was established at Detroit early in the third quarter, which was designated $2 a ton above the Pittsburgh base. The move was short-lived, however, and soon mills withdrew the Detroit base.

Relative gains were noted in the use of corrosion and heat-resistant bars. An acute depression occurred in the farm equipment market, although finished stocks of implement and tractor works became much reduced during the year, leaving these concerns in a better strategic position than for two years. These consumers have become more active in alloy bar demand. The rising grain prices late in the year, accompanied by sharp cuts in implement prices, resulted in mild activity.

Foreign imports of bars added to dullness in demand along the Atlantic seaboard, although imports were somewhat lighter than in 1930. In the New York market both foreign iron and steel bars competed. Prices for foreign bars were so low that they afforded no common ground for domestic quotations.

Warehouse Sales Reduced and Prices Drastically Cut by Mill Competition

STEEL warehouse interests experienced not only a severe reduction in sales volume in 1931 but also a series of drastic price cuts. Especially was the latter true in western markets, where reductions of $5 to $10 were effected during the year on standard steel products.

Though the poor volume of business prevailed all year, the low point was reached in August and continued through October at the lowest level for that time since 1921. Business for 1931 averaged 35-40 per cent under 1930.

In the eastern jobbing trade mill competition was unusually keen, the local trucking competition with the railroads on short hauls aiding the mills in soliciting warehouse business. At Pittsburgh mill competition was not so marked.

The 1931 mill revision on sheet classification was accepted at some jobbing centers, but was not universal. Western warehouses, however, continued to market less sheets, there being a continuation of the trend toward disappearance of the western sheet jobber. More cold-rolled and cold-finished alloy steel was apparently sold the country over from stock in 1931 in proportion to total warehouse business.

Bars from stock were under price pressure at Pittsburgh during 1931, perhaps more than any other product at that point. At Chicago, cold-rolled strip was cut $10; No. 23 and 31 series cold-finished alloy steel was off $5, bars, shapes, bands, hoops and blue annealed sheets were down $3; galvanized and black sheets, track bolts declined $5.

In November of 1931 a slight upturn in day-to-day sales was recorded, although December business was not promising and in declining volume reflected inventory shutdowns and year-end seasonal recession.

Sheets Are Reclassified; Most Grades Move Narrowly

ESTABLISHMENT of new classifications for steel sheets marked the beginning of a period of steadier prices but was unable to remove the industry from the profitless condition resulting from previous declines in quotations and a demand which engaged mills at only 30 to 50 per cent of capacity most of 1931. Prices in December showed little change from January, but producers had surrendered from $6 to $14 a ton in 1930.

There were few exceptions to the sharp contraction in requirements of consumers. Production of automobiles, the largest sheet outlet, was the smallest since 1921 and off 25 to 30 per cent from 1930. Manufacture of steel furniture was fairly good the first five months but dropped substantially thereafter, while demand for building purposes was off markedly.

Consumer Needs Vary Widely

Electric refrigerator output compared favorably with that of 1930, consumption of culvert sheets was at a new peak but activities of stove, farm implement, heavy electrical equipment and radio interests were reduced materially. Production of galvanized and enameled ware was well maintained, but steel barrel output dropped about 25 per cent from 1930.

Sheet mill operations in the Pittsburgh and Youngstown districts moved up to better than 40 per cent in March, but by fourth quarter had slipped below 30 per cent. In the Chicago district output averaged around 45 per cent, but was close to 75 per cent in March. The leading Chicago independent producer abandoned its Milwaukee unit of ten hot mills to concentrate its activities at its Indiana Harbor plant where 300,000 to 400,000 tons annually in continuous sheet, strip and plate mill capacity is being added. New sheet mill construction generally was quiet.

Sweeping changes in classification of sheets were announced by an independent interest in April, effective May 1, and although eventually adopted by the entire industry, did not find general application until July 1. Under the new schedule all grades of sheets, except galvanized, are classified as hot-rolled, hot-rolled annealed or cold-rolled, regardless of whether the sheets are rolled on continuous or old type mills.

Small advances were announced in base prices on several grades in connection with the new classification and these were partly maintained. Black sheets, later known as hot-rolled annealed sheets, opened the year at 2.35c, but had declined to 2.15c by June when they were advanced to 2.40c, at which level they remained. Galvanized sheets lost $3 a ton during first half from its January figure of 2.90c, but returned to that level during third and fourth quarters. Blue annealed material dropped from 1.90c to 1.85c for Nos. 9-10 gage. Autobody sheet prices dropped from 3.30c to 3.00c.

Year's Sheet Situation Summarized

Figures of Independent Producers to National Association of Flat Rolled Steel Manufacturers

1929	Sales	Per cent of capacity	Production	Per cent of capacity	Shipments	Per cent of capacity
November	134,391	43.3	204,071	65.8	207,200	66.8
December	234,599	77.4	181,916	60.0	178,575	58.9
1930						
January	382,122	101.8	291,529	77.6	241,677	64.4
February	203,315	61.8	275,952	83.9	241,441	73.4
March	299,764	85.1	259,658	73.7	275,285	78.1
April	300,086	81.5	308,988	84.0	291,601	79.2
May	204,589	54.7	274,220	73.3	266,436	71.2
June	187,412	53.6	205,675	58.8	212,930	60.9
July	207,400	56.2	186,206	50.4	194,767	52.7
August	148,969	41.0	173,956	48.6	205,774	57.5
September	214,454	58.2	179,928	48.3	186,639	50.7
October	158,700	41.4	193,934	50.6	193,615	50.5
November	135,682	39.8	148,550	43.6	158,182	46.4
December	233,289	63.9	145,125	39.8	144,040	39.5
1931						
January	180,863	48.6	167,865	45.1	170,739	45.7
February	168,564	50.2	192,218	57.2	179,138	53.3
March	236,310	64.3	224,322	61.1	208,207	56.7
April	191,987	52.3	213,608	58.2	211,118	57.5
May	148,612	41.7	201,846	56.6	191,942	53.8
June	163,599	44.5	147,843	40.3	156,160	42.5
July	144,461	38.2	174,890	46.3	178,460	47.2
August	122,849	34.6	123,752	34.9	151,529	42.7
September	120,688	33.0	116,842	32.0	123,371	33.8
October	117,195	31.6	122,739	33.1	129,365	34.9

Stripmakers Average Only 30 Per Cent Production and Profits Are Absent

STRIP producers shared with sheetmakers an unsatisfactory year in orders and profits. Feeling keenly the sharp decline in automobile production to the lowest level since 1921, operations were spotty the entire year, averaging around 30 per cent for hot mills and dropping down to 20 per cent on occasions. Cold-strip production was on an even lower basis. Demand expanded seasonally early in the year, declining during the second and third quarter. Delay in production of most new automobile models postponed strip buying until late in the year, but tonnage involved then was moderate.

Orders were small in size as well as in number and mills frequently were unable to arrange operating schedules for more than a few days ahead. Operation over a portion of a week became the general rule, demands of consumers for prompt delivery making shutdowns on alternate weeks difficult.

Little change occurred in the relative amount of strip consumed by the automotive industry compared with tonnage of other steel products. One large interest, however, abandoned the use of disc wheels in favor of the wire type, although strip makers regained some of the lost market through use of a slightly heavier rim. Strip requirements of other consumers declined in a similar volume to that in automotive material, although business in heat and corrosion resisting material was well maintained as the result of better

diversification of demand. The slump in automotive consumption of this product, however, reduced total business from the fairly large 1930 volume.

Prices tended downward during the year, with hot strip showing more resistance to the decline than cold-rolled strip. Hot strip was 1.65c to 1.70c and 1.55c to 1.60c for the two widths, in January, with the usual $2 differential for Chicago mills over Pittsburgh base. An attempt to advance the market in the second quarter to 1.60c and 1.70c was unsuccessful except to strengthen the lower figures for a short time. The market shortly slipped $1 a ton to the larger buyers but this loss was eliminated in the third quarter and the market held at 1.55c and 1.65c until November when it again dropped $1 to 1.50c to 1.60c.

Poor demand exerted considerable pressure against cold strip prices and sharp concessions occurred from the general market on several occasions. The market was 2.25c to 2.35c in January but settled to 2.15c by June. This figure was shaded $2 early in the fourth quarter and 2.05c became the usual price by the end of the year. Cooperage stock declined $4 a ton to 1.70c to 1.80c, Pittsburgh, during the 12 months.

Steel Pipe Buying Large but Less than 1930 Record Rate

ADVERSE conditions in general business had a quieting effect upon the market for steel pipe last year, delaying the carrying out of a number of pipe line projects and curtailing building construction and activities of miscellaneous consumers of tubular products.

The oil industry took only small quantities of drill pipe and casing, except in the east Texas field, where demand was relatively good. Producers of locomotive and boiler tubes experienced quiet business while output of mechanical tubing reflected the dullness in general industrial operations, including the automotive industry.

Line pipe orders were fairly heavy, suffering only in comparison with the unusual activity of 1930, but in view of the extra capacity added by producers during the past few years in seamless and electric welding mills this business was insufficient to provide steady operations over an extended period. The larger main lines placed in 1931 involved more than 550,000 tons, compared with about 900,000 tons in 1930, which was a record year.

As in several preceding years, 1931 saw its greatest activity in seamless and electrically welded pipe, lapwelded material finding little application for construction of long pipe lines.

Long Lines Are Completed

Much of the pipe line activity in the West resulted from the completion of lines started in 1930. Work completed during the year included two large gas line pipe systems running from Texas to Illinois, one being the Panhandle Eastern 22-inch line supplying gas to cities in Illinois and Missouri and the other a 24-inch line owned by the Natural Gas Co. of America and laid by the Continental Construction Corp., Chicago, to supply gas to Chicago. Both were of composite construction, welded sections of pipe being joined by mechanical couplings. The latter project, 900 miles long, required 188,000 tons of pipe, the largest tonnage involved in an individual line.

Among larger orders placed during the year for lines were 42,000 tons awarded by the Phoenix Utility Co., 25,000 tons by the Sinclair-Texas Pipe Line Co., 26,000 tons by the Texas Co., 35,000 tons by the Stanolind Pipe Line Co., 20,000 tons by the Lycoming Natural Gas Co., 20,000 tons by the Sun Oil Co. and 24,000 tons by the Southern Fuel Co.

Cast Pipe Sales Are in Good Volume as Trend of Prices Shrinks Profits

CAST pressure pipe orders again attained a more nearly normal volume, despite a sharp shrinkage in demand from public utility customers. Municipal purchases and numerous filtration works programs helped fill the gap.

While 1931 shipments fell off about 25 per cent from the active 1930 movement, they measured well with the volume of several preceding years. Price reductions on class B and C, as well as special process pipe, class 150 to 250, were sweeping, however, contrasting with the comparative stability in 1930. Sharpest reductions were in larger diameters.

In the East, prices for larger diameter class B dropped $8 to $11 a ton. In the West, reductions were $3 to $5 a ton.

An average of 65 per cent of pipe capacity was engaged. Several foundries operated almost full early in the year. Special process pipe represented about 75 per cent. Difficulties in disposing of municipal bonds carried over much work until 1932.

Several municipalities in the North Central and western markets placed their usual yearly quotas. Chicago purchased about 25,000 tons, a normal year's business. Detroit's 12,000 to 15,000 tons was about half usual needs. Lincoln, Nebr., bought about 5000 tons. Chicago sanitary district placed 4000 tons and the Pacific coast states bought about 35,000 tons.

Changes in Steel Pipe Discounts

Jobbers, Carloads, Base, Pittsburgh

			Inches	—Butt Weld— Black	Galv.
Jan.	1, 1919	to Mar. 21, 1919	¾ to 3	54	40½
*Mar.	21, 1919	to April 13, 1921	¾ to 3	57½	44
April	13, 1921	to July 7, 1921	1 to 3	62½	50
July	7, 1921	to Sept. 16, 1921	1 to 3	64½	52
Sept.	16, 1921	to Dec. 15, 1921	1 to 3	68½	56
Dec.	15, 1921	to Aug. 17, 1922	1 to 3	71	58½
Aug.	17, 1922	to Oct. 19, 1922	1 to 3	68	56½
Oct.	19, 1922	to Feb. 13, 1923	1 to 3	66	54½
Feb.	13, 1923	to April 19, 1923	1 to 3	64	52½
April	19, 1923	to April 1, 1930†	1 to 3	62	50½
‡April	1, 1930	to date	1 to 3	64	52½

*Level adopted by independent companies Dec. 31, 1920.

‡Since Sept. 21, 1924, Pittsburgh and Lorain basing discounts, jobbers' carloads, Evanston, Ill., and Indiana Harbor, Ind., take differential 2 points less discount or $4 per ton higher net. Chicago district base is 2 points less than Pittsburgh-Lorain basis or $4 per ton higher net. City of Chicago delivered base is 2½ points less or $5 per ton higher net.

†In final quarter of 1927 an extra 5 per cent was granted to jobbers. This was removed April 2, 1928.

Pig Iron Prices at Lowest Since 1915; Output Is Small

PIG iron prices in 1931 dropped to the lowest levels since 1915 as sharp competition developed from the extremely subnormal volume of business. Merchant furnaces faced a substantial reduction in demand from all leading iron consumers, the decline in some districts being more than 50 per cent from the 1930 rate.

The paucity in orders was particularly acute during third and fourth quarters and buyers followed their hand-to-mouth policy in purchases to a greater extent than ever before. Furnace operations were light all year, all the strictly merchant furnaces in the Pittsburgh and valley districts being out at one time, while only one was operating along the eastern seaboard during part of fourth quarter.

Some Stocks Are Reduced

Restricted production of iron enabled some furnaces to reduce stocks materially during the year, but at Cleveland and in the Middle West large surpluses accumulated. Stocks at Chicago and Duluth totaled more than 400,000 tons and in the St. Louis district 350,000 tons.

Light demands of steelworks on their blast furnaces in some instances resulted in more active participation of steel companies in the merchant market, one Chicago interest becoming a direct merchant distributor and dealing little through brokers as formerly. Cleveland and southern producers were induced by quietness in demand to go outside their local territories for a larger share of business than usual.

Prices Yield to Pressure

All of these factors contributed to pressure against prices. Valley pig iron quotations declined from $1 to $2 a ton while losses in the East ranged up to $3, December marking the lowest levels for the year. Basic pig iron averaged around $16.60, valley, in 1931, compared with $18 in 1930 and $18.20 in 1929, the market having declined from $17 in January to $15 in fourth quarter.

The basic quotation was nominal for a time as the result of lack of buying, and some special sales, for water delivery, or distress lots, were made at substantially lower figures than the generally recognized market.

Bessemer iron dropped from $17.50 to $16, averaging about $17 and comparing with $18.55 in 1930 and the same price in 1929. No. 2 foundry lost $1.50 from its high of $17, valley, early in the year, and averaged about $16.85, against $18 in 1930 and $18.45 in 1929. At Chicago northern merchant iron dropped from $17.50, to $16.50 at the close of fourth quarter, while charcoal iron was off to $20.04, the first reduction in four years.

Foundry iron in the Philadelphia district declined $2.50 to $3 a ton, while basic was relatively steady with a loss of less than $1, although absence of important business in the closing months made for a purely nominal quotation. With the drop in the gold standard abroad foreign iron was in increasing evidence in the East late in the year.

Fair quantities of continental foundry iron were sold at $16, duty paid, on cars at port of entry, and English foundry was reported offered down to $15. Indian irons were pushed more vigorously and southern material also was offered. At New York prices on Buffalo iron declined about $1 a ton. Cleveland prices dropped from $17.50, base, to $16 for local delivery, and from $16 to $15 for outside delivery. Price realization by valley producers was reduced materially at some points as the result of competition from Cleveland furnaces.

Shipments from Buffalo and Cleveland into the Chicago-Milwaukee area by boat were reduced sharply, totaling less than 6000 tons of base foundry and malleable grades, compared with more than 35,000 tons in 1930. Late in the season, however, 10,000 tons of silvery iron went by boat from Buffalo, and just before the close of navigation a Lake Superior district charcoal iron furnace laid down 12,000 tons at Chicago and Milwaukee docks for distribution during the winter.

Shipments of pig iron and billets over the New York state barge canal dropped 35 to 40 per cent from the 1930 total to around 75,000 tons.

The Neville Island, Pa., furnace commenced for the first time the production of silvery iron. Prices of silvery iron and bessemer ferrosilicon declined $2 during the year.

By-Product Coke Output Smallest For 10 Years; Beehive for 50 Years

PRICES and production of by-product and beehive coke declined to low levels last year under the pressure of poor demand. Operations of blast furnaces and foundry cupolas were subnormal and the large coke-producing capacity was provided engagement of less than 50 per cent. Total coke production was the smallest since 1921, while output of beehive ovens was at a new low level for the past 50 years.

Withdrawal of the beehive oven in recent years in favor of the by-product plant as the leading supplier of blast furnace coke accounts for the sharp decline in operations of the former. In the Connellsville district operation of beehive ovens identified with furnace interests was suspended in May. Output principally of merchant ovens, was less than 10,000 tons weekly during most of the 12 months. Production of by-product coke, after holding above 3,000,000 tons monthly for the past six years, dropped below this level during first quarter and touched a new low for the past ten years during fourth quarter.

Despite the decline in output stocks at ovens accumulated. In the Chicago territory supplies had increased to between 400,000 and 450,000 tons by late in the year, while stocks at all plants rose from 3,254,288 tons Jan. 1 to 4,214,295 tons Nov. 1. Foundry operations shared with blast furnaces the poorest rate since 1921, and coke orders placed by melters were in small lots for early requirements. Foundry schedules were at about 25 per cent over most of the year in nearly all districts.

Prices tended downward, beehive grades dropping to the lowest figures since 1914. Spot beehive furnace coke was $2.50 in January, closing the year at $2.35, this price applying to the standard grade. Higher-sulphur material sold down to $2, while at eastern points the market eased to $2 to $2.25, ovens. Standard foundry coke was $3.25 in the spot market all year and premium brands declined 25 cents to $4.50.

By-product coke in the Chicago district was reduced from $8, ovens, to $7.50, the differential for delivery in the Chicago switching area remaining 75 cents. By-product foundry coke along the eastern seaboard on June 1 underwent the first price change since early in 1928. In New England, the price was reduced 50 cents to $10.50; at Newark, 30 cents to $8.70 to

$9.10; and at Philadelphia, 25 cents to $8.75.

New coke oven construction at steel plants was confined largely to the Chicago district, where 138 ovens with a theoretical capacity of 1,021,200 tons annually were added at the Gary works of the Illinois Steel Co.

Refractory Sales Reflect Reduced Steel Production

SALES of refractory material slumped sharply at midyear after holding fairly well during first half. Mills abandoned the practice of keeping idle furnaces and heating equipment in repair during third and fourth quarters, and with the steady decline in operations refractory business was limited almost entirely to material for urgent work. Stocks also declined and refractory producers were able to operate at only 20 per cent for much of the second half. Total business compared with the 1921 volume, when repair work was confined to equipment in actual use.

Absence of new construction in the steel industry also served to reduce business below the 1930 and 1929 levels.

Prices declined, first quality fire clay brick and silica brick being reduced $3 per 1000 to $40 in March. In Missouri the market slipped to $37. Second quality fire brick dropped from $35 to $38 to a range of $25 to $35, the lower price reflecting sale of some material of lower quality than second grade brick. Magnesite brick continued $65 and chrome brick $45. Imported magnasite held at $40 and domestic material at $22.

Scrap Is Fully Liquidated; Collection System Periled

DESPITE difficulties and adverse trends the steel and iron scrap industry at the end of 1931, from the viewpoint of distributors and many buyers, had established itself in a sounder technical position than for two years. Prices declined steadily through the year.

A number of scrap preparation and classification yards were forced to close, some of them permanently. Nevertheless, the close of the year marked a thorough liquidation of prices and greatly reduced accumulations at points of collection and sorting.

Steel Grades at Record Low

While a number of buyers feel that the potential scrap supplies held back by large producers will mean retardation of prices at the next upturn of demand, dealer interests counter with the view that collection and accumulation machinery has virtually disintegrated or at least became seriously impaired.

Steelmaking grades in all districts dropped to the lowest monthly averages since about 1902. In Pittsburgh, heavy melting steel receded from $12.90 to an average of $10.25 at the end of 11 months. In the Philadelphia area, No. 1 steel scrap, at $10.50, delivered, fell to $8 by the middle of the year, and dropped to an average of $7.87½ at the close, the previous low mark having been $9.25 in November, 1914. At Chicago, melting steel declined steadily from $10 to an average of $8 by December.

The closing of a number of scrap yards at Chicago was attributed in part to the comprehensive railroad methods of sorting their scrap to the last possible classification. Western carriers adopted policies of shipping less mixed scrap in an effort to enhance the value of their listings. This scrap preparation by the roads proved costly in 1931, in view of low markets, but is indicative of a newer trend. The year was unusual with respect to the large tonnages held back by railroads and other large producers in all districts. In general, only 30 per cent of normal periodic lists were sold. The Pennsylvania railroad, the largest seller in the Pittsburgh district, offered no melting steel for several months.

Larger Movement by Water

Buyers bought only fill-in material on the declining market. The Detroit district receded further as a source of scrap to Pittsburgh mills. Requirements of Great Lakes Steel Corp. took a substantial portion of old material produced there. Buffalo mills continued to receive scrap by barge and for the first time furnaces there ordered lake shipments from Chicago. Little scrap could be moved at a profit from Youngstown to Pittsburgh. The low price of borings and turnings in the East induce some mill interests to use more scrap in the blast furnaces, thereby cutting down also on coke consumption per ton of iron.

Chicago, for the first time, moved a substantial part of scrap receipts from the district. Four cargoes of cast borings, totaling 12,000 tons, were shipped to Buffalo. Several cargoes of automotive cast scrap moved to Saginaw, Mich.

Situation Goes Back Decade

At the beginning of 1932, the scrap market was in a position similar to 1922, starting with a low market and a virtual breakdown of collection machinery. A favorable factor is the fact that so little iron ore had been shipped from the Lake Superior region during the 1931 season.

Considerable scrap moved from New York to Buffalo by the state barge canal and some tonnages are in barge storage for early 1932 shipment, present low prices being tempting.

Semifinished Steel Demand Held Back By Slow Operations of Finishing Mills

PRODUCTION of semifinished steel last year reflected the low rate of finishing mill operations, although stocks accumulated to fairly large proportions by fourth quarter. Nonintegrated producers of finished products, however, adjusted their purchases of semifinished steel to current consumption, carrying only small stocks and buying in limited lots. Mills were in a position to provide prompt delivery of billets, wire rods and sheet bars.

Quiet in automotive operations contributed indirectly to poor demand for rods, sheet bars and billets, through sheet, strip, bar and bolt and nut sales and directly to small orders for forging billets. Semifinished requirements of tin plate producers were better maintained than those of other mills.

Water shipments of sheet bars from Chicago mills, particularly to the Detroit district, tended to increase. The normally heavy demand for axle billets was reduced materially, and steel scrap interests competed in the direct sale of this material.

Prices were fairly steady, the market showing a range of only $2 a ton on the various grades. Rerolling billets, sheet bars and slabs declined from $30 to $29 at midyear, holding the latter figure during second half. Forging billets declined from $36 to $35. Wire rods were $35 in January, were advanced to $37 in the first quarter, but shortly returned to $37, where they remained until December, when $2 advance was made.

Ferroalloy Needs Lessened By Restricted Steel Output

REFLECTING the sharp downward trend in steelmaking operations, ferromanganese consumption in 1931 fell to the lowest point in years. Notwithstanding this and other depressing factors, however, prices remained fairly steady at $89.79, Pittsburgh, until near the close when a cut of $10 a ton was announced on first half contracts for the current year.

While importations showed a further decline, they nevertheless were more of a factor in view of light consumption. During last half they were particularly felt by domestic producers, with offers made by Yugoslavian in addition to other more usual sources.

Trading in manganese ore came to a virtual standstill in the last half, with some of the larger consumers holding up shipments against existing contracts. The first cargoes of South African manganese were received here early in the year, and this ore continued a factor on such business as was offered.

Prices tended downward through the greater part of the year, with the sharpest reduction following the suspension of the gold standard by England and some other European countries in September. The year opened at $24.20, per gross ton, duty paid, basis 50 per cent, to ease off to $22.20 at the close.

Domestic spiegeleisen consumption suffered in almost direct proportion to the decline in ingot production, with prices on 19 to 21 per cent material easy through most of the year at $30, furnace, on lots up to 100 tons. Early in December the official price was reduced $3 a ton to $27. British spiegeleisen, which has been largely nominal at $31.50, duty paid, for 26 to 28 per cent material declined correspondingly. Offerings of Canadian spiegeleisen were particularly noticeable in the Middle-West, although foreign importations as a whole dropped from the preceding year. High silicon spiegel was tested in a number of plants for the first time, and apparently with success.

While consumption of low carbon ferrochrome was supported last year by activity in the making of stainless steels, movement of other ferroalloys to consuming plants was considerably under 1930.

Most ferroalloy prices were unchanged throughout 1931. Silicomanganese and 15 per cent ferrosilicon were adjusted slightly downward near midyear, however.

Ferrosilicon, 50 per cent material, was quoted for 1932 at $77.50 a gross ton in carlots compared with $83.50 for 1931 contracts. Ferrochrome prices for this year's contracts were reduced 1 cent a pound from last year's level. Ferrovanadium, 30 to 40 per cent per pound contained, was quoted 10 cents lower for 1932 than prices prevailing in 1931.

Manganese Ore and Alloy Statistics

In Gross Tons

	—PRODUCTION—		——IMPORTS——		
	Ferro-manganese	Spiegel-eisen	Ferro-manganese	Spiegel-eisen	Manganese ore
1931*	164,100	67,800	†18,784	.....	‡276,856
1930	277,855	79,140	†37,979	.....	‡266,467
1929	333,191	136,702	†62,185	.....	‡321,456
1928	315,988	102,498	†47,602	.....	‡207,808
1927	295,849	97,328	†34,018	.....	‡308,594
1926	319,510	74,070	†43,684	.....	‡364,307
1925	260.149	65,747	†77,597	.....	‡289,703
1924	199,418	107,135	†47,811	.....	‡231,393
1923	242,450	123,148	91,066	4,668	‡206,048
1922	150,039	68,589	95,007	8,157	374,451
1921	100,694	55,042	9,057	307	401,000
1920	286,365	110,685	59,254	5,234	601,437
1919	175,009	84,014	33,022	27	333,344
1918	325,133	303,535	27,168	.....	491,303
1917	328,000	187,000	51,800	.....	663,500
1916	275,204	187,233	90,928	.....	576,321
1915	144,260	114,556	55,263	200	313,985
1914	100,731	76,625	82,997	2,870	283,294
1913	119,495	106,980	128,070	77	345,090
1912	125,378	102,561	99,137	1,015	300,661
1911	74,602	104,013	80,263	20,970	176,852
1910	71,376	153,055	114,228	25,383	242.348
1909	82,209	142,831	88,934	16,921	212,765
1908	40,642	111,376	44,624	4,579	178,203
1907	55,918	283,430	87,400	48,994	209,021
1906	55,520	244,980	84,359	103,268	221,260
1905	62,186	227,797	52,841	55,457	257,033

*Estimated. †Includes Spiegeleisen. ‡Manganese content

Canada Goes Back to Prewar Days In Steel and Iron Tonnage in 1931

THE world-wide industrial depression that took heavy toll from all branches of industrial activities and production in 1931, was decidedly unfavorable to the steel and iron industry of Canada. While all sections of the industry were more or less affected by the decline in business, the primary branch received the heaviest blows from the restricted buying power that prevailed.

Many Canadian plants started the year with substantial book orders but as the year progressed there was noticeable slowing in new business with the result that by the end of the first half many plants had exhausted their backlogs and were depending entirely on spot orders to keep their plants in operation. The rail mills at Sault Ste. Marie, Ont., and Sydney, N. S., were in operation until about the end of July, when all orders were completed and the mills shut down.

Steel Operations Hard Hit

Other branches of the steel plants were affected by the suspension of rail rolling, and the mills at the two centers mentioned above practically closed their entire works for a short time. About the middle of October there was a slight revival and both the Algoma Steel Corp. and the Dominion Steel & Coal Co., resumed operations in some departments, but on part time production. The Steel Co. of Canada Ltd., Hamilton, Ont., while curtailing operations, did not close down during the year, although for several months it had only one of its two blast furnaces blowing.

Some idea of the trend of business in Canada's steel industry for the year is gathered from the operations of blast furnaces. In January, three

furnaces were blowing, in February, the Algoma Steel Corp., Sault Ste. Marie, Ont., blew in a second stack, making four at the end of the month; in June a furnace was banked at Sault Ste. Marie, and one blown in at Port Colborne, Ont.; in July, the Dominion Steel & Coal Co., Sydney, N. S., banked its furnaces, leaving three stacks in at the end of the month; the three stacks continued blowing until September, when one at Port Colborne and one at Sault Ste. Marie blew out, leaving only one stack in at the end of September, owned by the Steel Co. of Canada Ltd., Hamilton, Ont. During October, the Algoma Steel Corp. again blew in its No. 3 furnace with the result that two were in blast at the close of the year. There are 11 blast furnaces in Canada.

Canadian Output by Years

Gross Tons

Year	Pig iron	Ferro-alloys	Steel ingots	Steel castings
1923	880,018	28,961	839,710	45,060
1924	593,024	26,400	625,175	25,515
1925	570,397	25,709	733,855	18,840
1926	737,503	57,416	743,550	33,338
1927	709,697	56,230	867,928	39,710
1928	1,037,727	44,882	1,190,001	44,718
1929	1,090,244	80,010	1,309,543	70,145
1930	747,448	66,494	957,430	54,314
1931* ..	451,332	50,624	664,826	37,055

*December estimated.

According to actual production figures, in some respects output fell back to the level of 1925, and in others to pre-war days. The accompanying table shows official production of pig iron, ferroalloys, steel ingots and castings from 1923 to the end of last year.

Prices underwent practically no change during the year, pig iron and scrap grades maintaining a fairly even level, production apparently holding fairly even with requirements. Tariff charges on steel and iron products were raised during the year and this may have aided in maintaining a better balance and prevented sharp declines in price.

Nonferrous Market Strives To Limit Its Pace to Needs

WHILE consumption of nonferrous metals has run considerably less than a year ago and prices have followed a downward trend from the general level of 1930, producers of all metals have made strong effort to retard production and keep their industries in statistical balance. Zinc producers have been particularly successful in this respect.

Total stocks of slab zinc at the close of November were still 12,753 tons under the total at the end of 1930. During the first eleven months of the year, surplus supplies of slab zinc were cut in six months and the increases reported in the last three months aggregated only a little over 1000 tons.

Production, in the meantime, was reduced to the extremely low figure of 684 tons daily in November, against a less restricted output of 1070 tons daily a year earlier. Daily prices of prime western zinc fell to low levels for the century with some recovery effected in June and July. The effects of the general business depression for the country as a whole were reflected in the fall of shipments to less than 1000 tons daily in April and a low for the first 11 months of 674 tons daily in October.

Copper Output Is Reduced

Copper producers, with an industry in a far less favorable statistical position than zinc last year, made concerted efforts in this country to curtail production. Conferences with foreign producers were called in June and October to effect adequate programs of reduced output, but both conferences broke up with no plan of accord reached on a world basis. However, negotiations were continued at long distance in November and December and the larger producers here and abroad came to an agreement in this way. Copper statistics, in the meantime, were withheld from the public in November, but reports in the trade indicated that refined metal stocks in North and South America continued to increase by large tonnages to record levels. Electrolytic copper prices for the year reached new low ground. Agitation on the part of the higher-cost producers in the United States for an import duty on copper increased in the last few months of 1931 as large prospective production abroad, especially in Africa, was viewed as an increasing threat to the American companies' domestic market.

Lead Holds Up Well

Lead prices were about 1 cent a pound less in 1931 than the general level in 1930. Lead shipments to consumers were under the average rate for 1930, but were better sustained than the average movement of copper to fabricators. Refined lead production in the United States also was held in better balance with consumption than the output of copper, and marked cuts in total stocks were effected in June through September. Nevertheless, the zinc industry outdid that of lead in maintaining a more favorable statistical balance.

Demand for tin last year followed the retarded rates of the other nonferrous metals. Straits tin prices here fell in December to new low levels since 1889. The International Tin Producers, through curtailment of output and exports from the leading mining centers of the world, brought about reductions from the largest world's visible supply in history, which was recorded at the end of July. A tin pool was also formed abroad to take metal from an already burdened market.

Aluminum prices were unchanged throughout 1931 and buying was lighter than in the preceding year. Antimony sales were light and prices weak.

Average Monthly Nonferrous Prices in 1931

Prompt, wholesale prices in cents per pound

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Tin, spot Straits, N. Y.	26.105	26.301	27.047	25.192	23.212	23.445	24.963	25.747	24.680	22.763	22.854	21.250
Copper, elec., del. Conn.	10.072	9.951	10.119	9.627	8.897	8.276	7.937	7.529	7.240	7.000	6.799	6.500
Zinc, prime west., E. St. L.	4.035	4.016	4.005	3.761	3.304	3.409	3.902	3.818	3.747	3.379	3.203	3.165
Lead, open market, N. Y.	4.800	4.552	4.527	4.412	3.818	3.919	4.400	4.400	4.00	3.971	3.939	3.625
Aluminum, 98-99% del.	22.900	22.900	22.900	22.900	22.900	22.900	22.900	22.900	22.900	22.900	22.900	22.900
Antimony, spot N. Y.	7.331	7.052	7.105	6.882	6.531	6.260	6.822	6.610	6.538	6.540	6.710	6.250
Nickel, ingot	35.000	35.000	35.000	35.000	35.000	35.000	35.000	35.000	35.000	35.000	35.000	35.000

Coal Tar Products Market in 1931

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Benzol	$0.207	$0.20	$0.19	$0.19	$0.19	$0.185	$0.18	$0.18	$0.18	$0.20	$0.20	$0.20
Toluol	0.30	0.292	0.275	0.27	0.27	0.27	0.27	0.27	0.27	0.30	0.30	0.30
Solvent naphtha	0.25	0.25	0.25	0.25	0.25	0.245	0.24	0.24	0.24	0.26	0.26	0.26
Phenol	0.165	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Naphthalene flakes	0.0375	0.0375	0.0375	0.0375	0.0375	0.0375	0.0375	0.0375	0.0375	0.0375	0.0375	0.0375
Naphthalene balls	0.0475	0.0475	0.0475	0.0475	0.0475	0.0475	0.0475	0.0475	0.0475	0.0475	0.0475	0.0475
Sulphate of ammonia	1.95	1.925	1.85	1.83	1.80	1.675	1.525	1.375	1.30	1.30	1.18	1.10

By-Product Output Is Cut; Prices Hold

WHILE demand for coke oven by-products declined last year, curtailed production tended toward firm prices, especially in the closing months. Distributors open the year with few large stocks and, in the case of distillates, are unwilling to take on large contracts at current prices. Output in some by-products declined to close to 70 per cent of normal. Prices were generally under the previous year.

Consumption dropped rather sharply at times, but at no period did stocks pile up seriously. Benzol did not fall below 18.00c, but for nearly four months, starting in June, was at that figure. Prices were at their high point at the start of the year, weakening slowly until late in September when an advance of 2.00c was made and maintained as output of distillates continued light. The price trend in toluol followed much the same curve, opening and closing at 30.00c with slight fluctuations during nine months of the year.

Xylol and solvent naphtha demand was steady, although not brisk during most of the period. Prices held at 25.00c until June when weakness developed, declining one cent. With the firming of the market in September, the price was marked up to 26.00c at which point it closed.

Phenol was steady in price and volume. Most business was at 17.00c and, although some shading of this price was noted, the market did not openly break at any time. Industrial consumption of phenol showed a decided decline, but the drug trade held well. However, nothing like a shortage of phenol developed as was the case two years back, demand and production being fairly well balanced.

After a slow start, naphthalene volume developed satisfactorily and the total compares well with the previous year. Consumers have again been slow to cover for 1932 and as a result stocks have gathered, although not to an extent to warrant uneasiness. Contract buyers have gradually come into the market with business which compares well with the opening of 1931. Prices on both flakes and balls fluctuated but little with 3.75c covering most sales of flakes and 4.75c balls. There was some shading on both flakes and balls, but never serious enough to break the price. Contracts have been placed for this year at unchanged prices.

Sulphate of ammonia prices weakened steadily during last half, the result of world conditions and the upset in the nitrate agreement abroad. Following this, the market broke sharply, the domestic price going to $22 a ton on bulk, Atlantic seaboard, and even lower. Contracting was lighter than normal and with the market between seasons the outlook for 1932 is uncertain, buying on the part of fertilizer interests depending somewhat on the outlook in cotton and the general credit situation.

Steel Ingot Production

Compiled by American Iron and Steel Institute

Gross Tons

	1922		1923		1924		1925		1926	
	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.
January	1,891,857	72,764	3,841,095	142,263	3,649,913	135,182	4,193,281	155,307	4,132,210	158,931
February	2,071,772	86,324	3,471,843	144,660	3,826,246	153,050	3,752,352	156,348	3,785,051	157,710
March	2,814,667	104,247	4,066,680	150,618	4,206,699	161,796	4,194,340	161,321	4,468,617	165,504
April	2,902,240	116,090	3,963,736	158,549	3,348,466	128,787	3,583,676	137,834	4,105,799	157,915
May	3,218,794	119,215	4,216,355	156,161	2,640,034	97,779	3,454,971	132,883	3,927,979	151,076
June	3,127,775	120,299	3,767,256	144,894	2,065,676	82,627	3,204,451	123,248	3,734,153	143,621
July	2,952,806	118,112	3,531,458	141,258	1,877,789	72,223	3,084,472	118,634	3,634,993	139,807
August	2,629,256	97,380	3,695,788	136,881	2,552,891	98,188	3,420,998	131,577	3,986,966	153,345
September	2,818,261	108,395	3,356,776	134,271	2,827,625	108,755	3,489,565	134,214	6,913,383	150,515
October	3,410,265	131,164	3,577,091	132,485	3,125,418	115,756	3,888,814	144,030	4,074,544	156,713
November	3,430,309	131,935	3,134,321	120,551	3,121,149	124,846	3,902,900	156,116	3,705,744	142,529
December	3,300,416	132,017	2,863,266	114,531	3,569,251	137,279	3,970,918	152,728	3,466,766	133,337
Total	34,568,418	*111,511	43,485,665	*139,825	36,811,157	*117,984	44,140,738	*141,932	46,936,205	*150,920

	†1927		†1928		†1929		†1930		†1931	
	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.
January	3,789,874	145,764	3,990,902	153,496	4,300,131	166,672	3,778,235	139,935	2,458,689	91,063
February	3,812,046	158,835	4,043,457	161,738	4,328,713	180,363	4,035,111	168,130	2,502,366	104,265
March	4,535,272	167,973	4,507,217	166,934	5,068,176	194,930	4,254,331	163,628	2,993,590	115,138
April	4,127,335	158,744	4,305,382	172,215	4,950,053	190,387	4,109,492	158,057	2,722,479	104,711
May	4,047,251	155,663	4,207,212	155,823	5,286,246	195,787	3,982,915	147,515	2,505,485	96,365
June	3,495,609	134,446	3,743,903	143,996	4,902,955	196,118	3,418,535	136,741	2,075,910	79,843
July	3,204,135	128,165	3,805,598	152,224	4,850,583	186,561	2,922,220	112,393	1,886,153	72,544
August	3,498,549	129,576	4,178,610	154,763	4,939,086	182,929	3,060,763	117,722	1,719,462	66,133
September	3,268,881	125,726	4,147,893	165,916	4,527,887	181,115	2,840,379	109,245	1,547,602	59,523
October	3,316,292	127,550	4,649,968	172,221	4,534,326	167,938	2,692,539	99,724	1,592,376	58,977
November	3,127,015	120,270	4,266,835	164,109	3,521,111	135,427	2,212,220	88,489	1,593,684	63,747
December	3,175,484	122,134	4,018,208	160,728	2,903,012	116,120	1,979,547	76,136	.....	.....
Total	43,397,743	*139,543	49,865,185	*160,338	54,312,279	*174,638	39,286,287	*126,322	‡23,597,796	*82,799

*Average. †Beginning with 1927, the Institute excludes crucible and electric ingots, which totaled 675,123 tons in 1927, 810,029 tons in 1928, 958,076 tons in 1929, and 614,852 tons in 1930. ‡Eleven months.

Pig Iron Production

IN GROSS TONS

Annual Statistics of Coke and Anthracite Pig Iron Compiled by American Iron and Steel Institute, Monthly Statistics, 1911 to date, by STEEL (Iron Trade Review prior to July 1, 1930)

Year	Tons	Year	Tons	Year	Tons	Year	Tons
1855	396,657	1869	1,361,153	1883	4,085,041	1897	9,397,469
1856	457,738	1870	1,339,284	1884	3,670,567	1898	11,477,184
1857	417,711	1871	1,363,043	1885	3,687,522	1899	13,335,937
1858	374,804	1872	2,101,760	1886	5,273,010	1900	13,404,760
1859	496,952	1873	2,045,231	1887	5,900,914	1901	15,494,913
1860	572,713	1874	1,886,479	1888	5,955,105	1902	17,431,138
1861	478,809	1875	1,656,777	1889	7,028,374	1903	17,503,568
1862	536,609	1876	1,593,382	1890	8,574,558	1904	16,157,504
1863	656,785	1877	1,782,805	1891	7,702,906	1905	22,639,452
1864	798,342	1878	2,039,252	1892	8,619,379	1906	24,874,184
1865	597,536	1879	2,151,431	1893	6,737,713	1907	25,343,964
1866	918,717	1880	3,355,228	1894	6,434,966	1908	15,686,872
1867	997,576	1881	3,573,863	1895	9,220,967	1909	25,419,468
1868	1,100,893	1882	4,000,193	1896	8,311,833	1910	26,907,060

	—Stacks— No.	In	—Output— Total	Av. Daily
			1911	
January	421	210	1,766,658	56,985
February	421	226	1,781,285	63,617
March	421	236	2,165,764	69,863
April	421	220	2,044,904	68,163
May	421	206	1,871,388	60,367
June	421	202	1,773,282	59,109
July	423	196	1,776,108	57,294
August	423	206	1,921,832	61,995
September	423	216	1,973,918	65,797
October	421	214	2,092,061	67,486
November	421	214	1,999,100	66,637
December	422	215	2,032,301	65,558
Total			23,198,601	*63,558

	—Stacks— No.	In	—Output— Total	Av. Daily
			1912	
January	421	227	2,052,806	66,220
February	422	235	2,098,796	72,372
March	420	237	2,411,529	77,791
April	421	239	2,377,621	79,254
May	423	243	2,503,341	80,753
June	424	242	2,433,737	81,125
July	422	245	2,402,567	77,502
August	423	255	2,500,163	80,650
September	419	262	2,444,454	81,482
October	422	280	2,683,645	86,569
November	423	289	2,639,562	87,985
December	423	291	2,777,292	89,590
Total			29,325,513	*80,124

	—Stacks— No.	In	—Output— Total	Av. Daily
			1913	
January	423	297	2,787,800	89,929
February	423	306	2,578,670	92,095
March	423	278	2,762,823	89,123
April	421	297	2,754,353	91,812
May	421	285	2,816,825	90,865
June	422	283	2,616,883	87,229
July	422	264	2,558,275	82,525
August	424	260	2,537,018	81,839
September	425	258	2,494,098	83,137
October	425	244	2,539,924	81,933
November	424	225	2,229,960	74,322
December	424	191	1,976,138	63,746
Total			30,652,767	*83,980

	—Stacks— No.	In	—Output— Total	Av. Daily
			1914	
January	423	199	1,879,336	60,624
February	423	219	1,888,607	67,450
March	423	232	2,341,551	75,534
April	422	212	2,261,501	75,383
May	422	198	2,097,019	67,646
June	422	193	1,904,566	63,486
July	422	187	1,955,324	63,075
August	422	187	1,996,483	64,403
September	422	180	1,882,718	62,757
October	422	162	1,767,227	57,007
November	421	150	1,501,269	50,042
December	421	154	1,495,325	48,236
Total			22,970,926	*62,934

	—Stacks— No.	In	—Output— Total	Av. Daily
			1915	
January	421	165	1,591,024	51,323
February	421	179	1,666,592	59,521
March	421	190	2,046,280	66,009
April	421	197	2,114,518	70,484
May	421	207	2,255,157	72,747
June	421	221	2,369,932	78,998
July	421	234	2,563,311	82,687
August	421	246	2,774,825	89,510
September	420	266	2,834,342	94,478
October	420	276	3,120,340	100,656
November	421	285	3,035,235	101,174
December	421	295	3,201,605	103,278
Total			29,573,161	*81,022

	—Stacks— No.	In	—Output— Total	Av. Daily
			1916	
January	421	304	3,171,878	102,319
February	421	312	3,078,548	106,157
March	422	315	3,327,630	107,343
April	422	320	3,225,496	107,517
May	423	321	3,364,584	108,535
June	423	325	3,213,818	107,127
July	419	316	3,221,127	103,907
August	419	317	3,197,838	103,156
September	419	326	3,208,041	106,935
October	419	328	3,508,180	113,167
November	420	322	3,317,805	110,593
December	422	309	3,184,178	102,715
Total			39,019,123	*106,609

	—Stacks— No.	In	—Output— Total	Av. Daily
			1917	
January	422	310	3,159,839	101,930
February	422	317	2,649,935	94,641
March	423	331	3,255,813	105,026
April	425	333	3,328,061	110,936
May	425	340	3,413,677	110,119
June	427	347	3,260,234	108,675
July	429	351	3,337,442	107,659
August	431	357	3,238,970	104,483
September	431	342	3,140,742	104,691
October	433	354	3,296,286	106,332
November	434	344	3,198,597	106,620
December	435	321	2,885,380	93,077
Total			38,164,976	*104,561

	—Stacks— No.	In	—Output— Total	Av. Daily
			1918	
January	435	294	2,403,227	77,523
February	435	319	2,318,242	82,723
March	438	338	3,209,996	103,548
April	437	351	3,273,355	109,112
May	437	360	3,451,884	111,351
June	437	353	3,316,148	110,538
July	437	364	3,408,584	109,954
August	438	371	3,378,479	108,983
September	438	364	3,413,223	113,774
October	437	364	3,482,392	112,335
November	437	360	3,347,844	111,595
December	435	351	3,434,114	110,778
Total			38,437,488	*105,308

	—Stacks— No.	In	—Output— Total	Av. Daily
			1919	
January	435	330	3,306,279	106,654
February	435	311	2,943,347	105,120
March	435	279	3,088,023	99,614
April	435	216	2,474,374	82,479
May	433	197	2,107,729	67,991
June	433	199	2,114,028	70,467
July	434	240	2,424,212	78,200
August	432	266	2,742,081	88,453
September	433	163	2,480,790	82,692
October	432	216	1,864,424	60,142
November	432	252	2,407,369	80,244
December	432	262	2,626,074	84,711
Total			30,578,730	*83,777

	—Stacks— No.	In	—Output— Total	Av. Daily
			1920	
January	432	285	3,012,373	97,172
February	432	305	2,984,257	102,904
March	433	315	3,375,768	108,895
April	433	278	2,752,670	91,754
May	433	297	2,991,825	96,510
June	433	302	3,046,623	101,553
July	434	291	3,043,918	98,190
August	434	306	3,145,536	101,468
September	434	317	3,124,308	104,143
October	435	290	3,288,341	106,075
November	435	255	2,935,081	97,836
December	435	202	2,700,268	87,105
Total			36,400,968	*99,456

	—Stacks— No.	In	—Output— Total	Av. Daily
			1921	
January	436	184	2,414,753	77,895
February	436	155	1,929,394	68,906
March	436	103	1,594,866	51,447
April	436	96	1,190,751	39,691
May	436	90	1,215,272	39,202
June	436	74	1,064,007	35,466
July	435	69	864,642	27,892
August	436	69	954,901	30,802
September	435	84	985,795	32,859
October	435	95	1,234,450	39,821
November	429	120	1,414,958	47,165
December	429	123	1,642,775	52,992
Total			16,506,564	*45,223

	—Stacks— No.	In	—Output— Total	Av. Daily
			1922	
January	430	127	1,645,804	53,090
February	429	139	1,630,180	58,220
March	429	155	2,035,908	65,674
April	429	161	2,070,161	69,005
May	427	175	2,309,348	74,495
June	427	191	2,362,455	78,748
July	427	170	2,403,030	77,517
August	427	143	1,810,665	58,408
September	427	189	2,024,008	67,466
October	428	218	2,629,655	84,827
November	428	241	2,846,110	94,870
December	428	253	3,083,520	99,468
Total			26,850,844	*73,563

	—Stacks— No.	In	—Output— Total	Av. Daily
			1923	
January	428	261	3,228,226	104,136
February	424	278	2,993,918	106,925
March	424	295	3,523,595	113,664
April	423	311	3,546,308	118,210
May	423	322	3,868,486	124,790
June	424	322	3,667,868	122,262
July	418	299	3,684,677	118,860
August	418	270	3,448,886	111,254
September	418	254	3,117,526	103,917
October	418	245	3,142,646	101,375
November	418	229	2,891,191	96,373
December	418	231	2,912,527	93,952
Total			40,025,850	*109,659

	—Stacks— No.	In	—Output— Total	Av. Daily
			1924	
January	414	248	3,015,480	97,273
February	414	263	3,073,619	105,987
March	410	269	3,465,389	111,787
April	410	234	3,226,107	107,537
May	411	187	2,619,986	84,515
June	411	158	2,022,836	67,427
July	411	145	1,783,457	57,531
August	411	150	1,882,986	60,741
September	411	174	2,053,617	68,454
October	411	182	2,461,727	79,410
November	411	204	2,514,979	83,832
December	411	229	2,956,389	95,367
Total			31,076,572	*84,908

	—Stacks— No.	In	—Output— Total	Av. Daily
			1925	
January	411	251	3,372,207	108,781
February	411	256	3,214,067	114,788
March	410	246	3,571,422	115,207
April	409	221	3,211,235	107,041
May	405	196	2,933,907	94,642
June	399	191	2,679,045	89,301
July	396	188	2,665,262	85,976
August	391	192	2,707,171	87,328
September	387	200	2,725,885	90,862
October	386	209	3,017,889	97,351
November	385	220	3,023,257	100,775
December	385	234	3,249,057	104,808
Total			36,370,404	*99,645

	—Stacks— No.	In	—Output— Total	Av. Daily
			1926	
January	385	225	3,319,789	107,089
February	382	223	2,923,850	104,423
March	377	235	3,458,171	111,554
April	376	237	3,438,805	114,627
May	376	229	3,477,820	112,187
June	372	220	3,232,478	107,749
July	372	217	3,224,663	104,021
August	372	215	3,200,723	103,249
September	372	216	3,163,269	105,442
October	374	218	3,334,206	107,555
November	375	216	3,237,992	107,933
December	369	203	3,089,175	99,651
Total			39,100,941	*107,126

	—Stacks— No.	In	—Output— Total	Av. Daily
			1927	
January	369	210	3,101,346	100,043
February	369	217	2,940,604	105,021
March	365	223	3,482,107	112,326
April	364	221	3,424,377	114,146
May	363	211	3,391,067	109,388
June	362	198	3,089,726	102,991
July	362	190	2,954,625	95,311
August	362	189	2,950,674	95,183
September	362	181	2,782,500	92,750
October	361	174	2,812,015	90,712
November	359	171	2,661,863	88,728
December	354	169	2,698,208	87,039
Total			36,289,112	*99,422

	—Stacks— No.	In	—Output— Total	Av. Daily
			1928	
January	353	184	2,855,515	92,113
February	353	186	2,898,668	99,954
March	350	197	3,199,175	103,199
April	349	195	3,181,975	106,066
May	345	199	3,292,790	106,219
June	343	189	3,082,340	102,745
July	342	185	3,072,711	99,120
August	340	183	3,136,995	101,193
September	340	194	3,063,593	102,120
October	338	196	3,373,539	108,824
November	337	194	3,304,656	110,155
December	335	198	3,369,784	108,702
Total			37,831,741	*103,365

	—Stacks— No.	In	—Output— Total	Av. Daily
			1929	
January	328	202	3,433,028	110,742
February	326	208	3,218,376	114,942
March	326	213	3,709,518	119,662
April	326	216	3,663,167	122,106
May	325	220	3,898,344	125,753
June	325	220	3,715,104	123,837
July	325	217	3,782,511	122,016
August	325	209	3,746,198	120,845
September	323	204	3,496,454	116,548
October	318	203	3,588,146	115,747
November	317	176	3,182,420	106,081
December	316	156	2,836,917	91,513
Total			42,270,183	*115.808

	—Stacks— No.	In	—Output— Total	Av. Daily
			1930	
January	314	173	2,838,751	91,573
February	314	180	2,845,937	101,640
March	314	184	3,252,822	104,930
April	314	182	3,191,119	106,371
May	314	180	3,241,477	104,564
June	312	162	2,934,508	97,817
July	312	144	2,638,441	85,110
August	312	137	2,525,105	81,455
September	310	126	2,276,781	75,893
October	310	111	2,165,374	69,851
November	310	107	1,865,458	62,182
December	310	95	1,665,715	53,732
Total			31,441,488	*86,141

	—Stacks— No.	In	—Output— Total	Av. Daily
			1931	
January	309	102	1,715,443	55,337
February	307	109	1,711,192	61,114
March	307	116	2,028,906	65,448
April	307	113	2,009,582	66,986
May	307	105	1,995,001	64,355
June	303	91	1,637,998	54,599
July	303	82	1,462,270	47,170
August	303	75	1,279,205	41,264
September	303	74	1,168,436	38,947
October	303	69	1,172,781	37,831
November	302	67	1,101,820	36,727
December	figures, Page 184			
Total			†17,282,634	*51,744

*Average.
†Eleven months.

Prices Tell Market History

Ores and Alloys

Per Gross Ton

Iron Ore Prices at Date of Buying Movement

Season	Date buying movement	Old range Bessemer Ton	Old range Bessemer Cents per unit	Old range Nonbessemer Ton	Old range Nonbessemer Cents per unit	Mesabi Bessemer Ton	Mesabi Bessemer Cents per unit	Mesabi Nonbessemer Ton	Mesabi Nonbessemer Cents per unit	Iron prices, Valley Bessemer	Iron prices, Valley No. 2 Foundry
1931	April 15, 1931	$4.80	9.320	$4.65	9.029	$4.65	9.029	$4.50	8.738	$17.00	$17.00
1930	April 1, 1930	4.80	9.320	4.65	9.029	4.65	9.029	4.50	8.738	19.00	18.50
1929	March 22, 1929	4.80	9.320	4.65	9.029	4.65	9.029	4.50	8.738	18.50	18.00
1928	April 16, 1928	4.55	8.835	4.40	8.544	4.40	8.544	4.25	8.252	17.50	17.25
1927	April 8, 1927	4.55	8.835	4.40	8.544	4.40	8.544	4.25	8.252	19.50	18.50
1926	March 17, 1926	4.55	8.835	4.40	8.544	4.40	8.544	4.25	8.252	21.00	20.50
1925	April 4, 1925	4.55	8.835	4.40	8.544	4.40	8.544	4.25	8.252	22.00	21.00
1924	March 24, 1924	5.65	11.364	4.90	10.680	5.40	10.909	4.75	10.388	23.00	22.00
1923	March 24, 1923	6.45	12.818	5.70	12.233	6.20	12.364	5.55	11.942	31.00	31.00
1922	June 9, 1922	5.95	11.909	5.20	11.262	5.70	11.454	5.05	10.971	25.00	24.00
1921	June 16, 1921	6.45	12.818	5.70	12.233	6.20	12.364	5.55	11.942	23.00	22.50
1920	Feb. 2, 1920	7.45	14.636	6.70	14.175	7.20	14.182	6.55	13.883	41.00	40.00
1919	April 28, 1919	6.45	12.818	5.70	12.233	6.20	12.364	5.55	11.942	27.95	26.75
*1918	Oct. 1, 1918	6.65	13.182	5.90	12.621	6.40	12.727	5.75	12.330	35.20	34.00
	July 1, 1918	6.40	12.727	5.65	12.136	6.15	12.273	5.50	11.845	35.20	33.00
	April 1, 1918	5.95	11.909	5.20	11.262	5.70	11.454	5.05	10.971	35.20	33.00
1917	Nov. 22, 1916	5.95	11.909	5.20	11.262	5.70	11.454	5.05	10.971	30.00	26.00
1916	Dec. 7, 1915	4.45	9.181	3.70	8.349	4.20	8.727	3.55	8.058	18.50	18.00
1915	April 19, 1915	3.75	7.909	3.00	6.990	3.45	7.455	2.80	6.699	13.60	12.75
1914	May 1, 1914	3.75	7.909	3.00	6.990	3.50	7.445	2.85	6.699	14.00	13.25
1913	Nov. 19, 1912	4.40	9.091	3.60	8.155	4.15	8.636	3.40	7.767	17.25	17.50
1912	March 20, 1912	3.75	7.909	3.00	6.990	3.50	7.455	2.85	6.690	14.25	13.25
1911	April 21, 1911	4.50	9.273	3.70	8.349	4.25	8.818	3.50	7.961	15.00	13.75
1910	Dec. 24, 1909	5.00	10.182	4.20	9.320	4.75	9.727	4.00	8.932	19.00	17.25

*Prices for 1918 established by government. All iron ore prices, delivered lower lake ports.

Manganese Ore, 1915-1931

Dollars Per Gross Ton, Duty Paid, North Atlantic Ports, on Basis of 50 Per Cent Ore

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$24.20	$24.20	$23.70	$23.70	$23.70	$23.70	$23.70	$23.70	$23.70	$22.70	$22.70	$22.70
1930	24.95	24.70	24.70	24.70	24.70	24.70	24.70	24.20	24.20	24.20	24.20	24.20
1929	27.70	27.70	27.70	27.70	27.70	27.70	26.70	26.70	26.70	25.70	25.70	25.70
1928	30.20	30.20	30.20	30.20	30.20	30.20	30.20	30.20	30.20	30.20	29.20	29.20
1927	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70
1926	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70
1925	32.20	32.70	33.20	33.20	32.70	32.20	32.20	32.20	31.70	31.70	31.70	31.70
1924	31.20	32.70	23.20	32.20	32.20	31.70	30.70	30.20	30.20	30.20	31.70	32.20
1923	29.45	29.45	31.70	33.20	32.70	32.95	32.95	32.95	31.70	31.70	31.70	31.70
1922	10.50	11.00	12.50	12.75	12.75	13.25	13.50	13.75	*14.35	25.50	25.50	25.50
1921	18.75	17.50	17.25	14.00	14.00	12.50	12.50	12.50	12.50	12.50	12.50	12.00
1920	30.00	38.75	38.75	32.25	35.00	37.50	42.25	35.00	35.00	32.75	25.00	21.25
1919	55.50	38.75	37.50	30.00	30.00	30.00	31.25	31.25	30.00	27.50	27.50	27.50
1918	63.75	63.75	60.00	65.00	65.00	65.00	68.50	65.00	65.00	65.00	62.50	55.00
1917	30.00	30.00	40.00	40.00	50.00	50.00	50.00	50.00	60.00	60.00	60.00	60.00
1916	22.50	22.50	22.50	22.50	22.50	22.50	22.50	22.50	30.00	30.00	30.00	30.00
1915	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	22.50	22.50	22.50	22.50

*After September, 1922, duty 1c per pound metallic content, $11.20 per gross ton 50 per cent ore.

Ferrosilicon, 10 Per Cent, 1916-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$25.00	$25.00	$25.00	$25.00	$25.00	$25.00	$25.00	$24.00	$23.00	$23.00	$23.00	$23.00
1930	30.00	30.00	30.00	30.00	30.00	29.50	29.00	29.00	25.00	25.00	25.00	25.00
1929	31.00	31.00	31.00	31.00	31.00	31.00	31.00	30.20	30.00	30.00	30.00	30.00
1928	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
1927	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	33.50	32.00	30.00
1926	35.00	35.50	36.00	34.40	33.00	33.00	33.00	33.00	33.00	33.25	24.00	34.00
1925	39.50	39.50	39.50	37.50	35.50	35.50	35.50	35.50	34.00	33.50	34.25	35.00
1924	41.50	42.50	42.25	41.50	40.30	39.50	39.50	39.50	39.50	39.50	39.50	39.50
1923	44.50	45.50	47.10	48.50	48.50	48.00	46.50	43.50	43.50	43.50	41.50	41.50
1922	38.50	37.50	36.50	37.25	40.50	41.50	41.50	42.50	48.50	50.00	48.00	44.50
1921	82.50	82.50	82.50	82.50	82.50	82.50	82.50	82.50	82.50	82.50	52.50	57.50
1920	82.50	82.50	82.50	82.50	82.50	82.50	82.50	82.50	82.50	82.50	82.50	82.50
1919	54.00	54.00	52.95	47.40	45.00	47.40	49.75	49.75	49.75	49.75	54.75	58.50
1918	55.00	55.00	55.00	55.00	55.00	55.00	55.00	55.00	55.00	57.00	57.00	57.00
1917	42.00	42.00	49.80	57.00	67.00	82.50	92.25	95.00	95.00	95.00	55.00	55.00
1916	28.00	28.00	31.00	31.00	32.00	32.00	32.00	31.80	30.25	30.50	34.60	42.00

Ferrosilicon, 50 Per Cent, 1916-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$83.50	$83.50	$83.50	$83.50	$83.50	$83.50	$83.50	$83.50	$83.50	$83.50	$83.50	$77.50
1930	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50
1929	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50
1928	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50
1927	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
1926	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
1925	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
1924	75.00	75.00	75.00	75.00	75.00	75.00	74.50	74.50	74.50	75.00	75.00	82.50
1923	85.00	90.00	92.50	95.00	95.00	87.50	82.50	82.50	82.50	82.50	80.00	75.00
1922	57.50	55.00	54.00	55.00	57.50	57.50	55.00	55.00	55.00	70.00	82.50	82.50
1921	80.00	92.00	93.00	90.00	80.00	75.00	75.00	65.00	65.00	60.00	60.00	57.00
1920	82.00	80.00	83.00	80.00	83.00	82.50	82.50	80.00	82.50	82.50	80.00	80.00
1919	145.00	125.00	115.00	110.00	110.00	85.00	80.00	78.00	80.00	85.00	80.00	80.00
1918	175.00	175.00	177.50	172.50	170.00	170.00	165.00	153.50	150.00	151.00	150.00	150.00
1917	122.50	156.25	175.00	187.50	230.00	230.00	237.50	225.00	212.50	171.25	157.50	172.50
1916	83.00	83.00	83.00	83.00	83.00	83.00	83.00	83.00	83.00	94.25	95.00	95.00

Spiegeleisen, 1915-1931

At Producers' Furnaces

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$27.00
1930	34.00	34.00	34.00	34.00	34.00	34.00	33.00	33.00	33.00	33.00	33.00	30.00
1929	34.00	34.00	34.00	34.00	34.00	34.00	34.00	33.20	33.50	34.00	34.00	34.00
1928	32.00	32.00	32.00	32.00	32.00	32.00	33.00	33.00	33.00	33.00	33.00	34.00
1927	37.00	37.00	37.00	37.00	35.50	34.80	34.00	33.35	33.00	30.15	30.00	31.00
1926	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	38.75	37.00
1925	32.00	33.00	33.00	33.00	33.00	32.00	31.50	32.25	33.00	33.00	34.00	34.00
1924	39.00	39.00	38.00	38.00	36.75	36.00	35.00	32.50	32.00	31.00	31.75	31.00
1923	34.90	35.75	37.25	39.25	43.00	46.00	45.00	45.00	43.50	40.00	39.00	38.00
1922	25.50	28.00	28.00	30.00	35.00	35.25	35.00	37.00	38.00	37.75	36.80	35.50
1921	46.25	37.75	34.20	32.00	31.75	29.60	27.50	26.20	25.25	24.85	25.00	25.00
1920	46.60	57.60	60.40	66.85	75.00	75.00	75.00	79.35	82.00	80.00	74.35	57.90
1919	*67.50	*52.50	*42.50	*34.50	*31.35	*27.50	34.00	34.00	34.00	34.00	34.00	39.00
1918	59.00	59.00	65.50	*70.00	*71.00	*75.00	*75.00	*75.00	*75.00	*75.00	*75.00	*72.50
1917	57.50	66.25	77.50	76.75	78.00	83.00	85.00	81.25	80.50	73.50	63.25	60.00
1916	32.50	42.50	55.00	60.00	60.00	55.00	47.50	47.50	45.00	40.00	45.00	50.00
1915	25.00	25.50	26.00	26.00	26.00	26.00	26.00	26.00	29.00	30.00	30.00	30.00

*Prices from and including April, 1918, and to and including June, 1919, are for 16 per cent spiegeleisen. All other prices apply to 20 per cent metal.

Ferromanganese, Delivered, Pittsburgh, 1914-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$89.79	$89.79	$89.79	$89.79	$89.79	$89.79	$89.79	$89.79	$89.79	$89.79	$89.79	$79.79
1930	104.79	103.79	103.79	103.79	103.79	103.79	103.79	103.79	103.79	103.79	103.79	93.25
1929	109.79	109.79	109.79	109.79	109.79	109.79	109.79	109.79	109.79	109.79	109.79	104.79
1928	104.79	104.79	104.79	104.79	108.19	109.79	109.79	109.79	109.79	109.79	109.79	109.79
1927	104.79	104.79	104.79	104.79	98.54	94.79	94.79	94.79	94.79	94.79	94.79	103.42
1926	119.79	119.79	102.29	92.79	92.79	92.79	92.79	92.79	92.79	99.79	104.79	104.79
1925	116.79	119.79	119.79	119.79	119.79	119.79	119.79	119.79	119.79	119.79	119.79	119.79
1924	113.79	112.29	112.29	112.29	112.29	112.79	110.79	98.79	97.79	104.79	107.29	109.79
1923	109.79	112.29	120.79	124.79	129.79	129.79	122.29	122.29	114.79	112.79	113.79	113.79
1922	61.90	65.32	67.82	69.07	72.32	72.82	72.29	72.29	†80.59	105.47	104.92	104.92
1921	101.00	96.85	89.00	87.50	83.00	76.50	75.00	70.75	64.75	61.65	60.00	60.00
1920	146.00	160.00	172.00	200.00	200.00	198.00	190.00	193.75	172.40	156.40	153.00	120.00
1919	*212.50	165.00	134.00	113.75	110.00	111.75	111.00	110.00	105.00	110.00	110.00	121.00
1918	250.00	250.00	250.00	250.00	*250.00	*250.00	*250.00	*250.00	*250.00	*250.00	*250.00	*236.00
1917	175.00	192.50	212.50	250.00	375.00	400.00	400.00	387.50	380.00	300.00	247.50	242.50
**1916	139.88	215.13	334.75	412.50	347.75	244.88	198.75	173.18	167.67	160.00	155.00	162.50
1915	68.00	78.80	95.00	95.00	97.00	105.00	103.57	101.36	110.00	109.64	100.42	103.04
1914	43.57	39.01	39.02	38.68	38.16	38.00	37.54	102.08	93.45	70.80	67.85	68.00

*Prices from May, 1918, to January, 1919, inclusive, were based on 70 per cent ferromanganese. All other prices in above table were based on 80 per cent metal.

†Duty of 1⅛ cents per pound contained manganese became effective on ferromanganese Sept. 21, 1922.

**Quotations seaboard to January, 1917; delivered Pittsburgh thereafter.

Pig Iron

Per Gross Ton

Bessemer, Delivered, Pittsburgh, 1895-1931

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
1931	$18.76	$18.51	$18.26	$18.26	$18.26	$18.26	$18.26	$18.26	$18.26	$18.16	$17.76	$17.51
1930	20.76	20.76	20.76	20.76	20.76	20.76	20.46	20.26	20.13	19.36	18.63	18.76
1929	19.96	19.86	20.11	20.26	20.56	20.76	20.76	20.76	20.76	20.76	20.76	20.76
1928	19.26	19.26	19.21	19.26	19.26	18.76	18.76	18.76	18.86	19.11	19.96	20.01
1927	21.26	20.76	21.16	21.26	20.86	20.66	20.26	20.26	19.86	19.76	19.76	19.26
1926	22.76	22.76	22.76	21.56	21.01	20.76	20.46	19.76	19.96	20.86	22.01	11.25
1925	24.66	24.66	23.96	26.76	21.66	20.76	20.76	20.76	21.06	21.56	22.66	22.76
1924	24.66	25.01	24.86	24.61	24.06	23.26	21.66	21.76	21.76	21.76	22.11	23.26
1923	29.27	29.57	31.67	32.77	32.07	30.27	28.52	28.07	28.27	27.27	25.47	24.27
1922	21.51	21.31	21.21	22.46	26.46	26.96	26.76	29.16	35.27	35.12	27.77	30.33
1921	33.96	30.96	28.96	27.46	26.06	25.06	22.96	21.96	22.46	22.06	21.96	21.96
1920	40.00	43.15	43.40	43.50	43.90	44.25	46.80	49.50	50.45	50.17	42.33	36.96
1919	33.60	33.60	32.55	29.35	29.35	29.35	29.35	29.35	29.35	29.35	32.00	36.65
1918	37.25	37.25	37.25	36.15	36.15	36.40	36.60	36.60	36.60	36.60	36.60	36.60
1917	35.95	35.95	37.45	42.20	44.95	55.20	57.95	55.55	48.27	37.25	37.25	37.25
1916	21.32	21.45	21.55	21.95	21.95	21.95	21.95	21.95	22.20	24.33	30.35	35.95
1915	14.70	14.63	14.55	14.55	14.55	14.58	14.88	15.89	16.80	16.95	17.45	19.70
1914	15.00	15.09	15.15	14.90	14.90	14.90	14.90	14.90	14.90	14.85	14.70	14.70
1913	18.15	18.15	18.15	17.90	17.90	17.26	16.65	16.52	16.65	16.60	16.09	15.90
1912	15.15	15.00	15.02	15.15	15.15	15.15	15.15	15.43	15.93	17.75	18.05	18.15
1911	15.90	15.90	15.90	15.90	15.90	15.90	15.90	15.90	15.90	15.39	15.10	15.15
1910	19.90	19.42	18.90	18.15	17.09	16.73	16.40	16.21	15.90	15.90	15.90	15.90
1909	17.34	16.78	16.34	15.80	15.48	16.13	16.37	17.13	18.33	19.68	19.80	19.90
1908	19.00	17.90	17.86	17.49	16.92	16.90	16.73	16.11	15.90	15.48	16.74	17.40
1907	22.92	22.78	22.85	22.16	24.10	24.10	23.30	22.90	22.90	22.80	20.60	19.90
1906	17.32	17.29	17.26	17.25	17.24	17.38	17.57	17.96	18.44	20.06	21.96	22.75
1905	16.85	16.45	16.35	16.30	16.20	15.65	15.00	15.40	15.90	16.50	17.70	18.10
1904	13.60	13.35	13.85	14.10	13.60	12.60	12.50	12.65	12.75	13.35	15.25	16.60
1903	22.35	22.35	22.00	21.60	20.00	19.85	19.00	17.85	16.35	15.85	15.25	14.35
1902	16.70	16.93	17.56	18.37	20.95	21.25	22.00	21.75	21.75	21.95	22.25	22.12
1901	13.25	13.60	16.56	16.69	16.65	15.94	16.00	15.90	15.71	15.90	16.10	16.35
1900	24.90	24.90	24.90	24.90	24.90	19.75	18.00	16.05	14.00	13.25	13.65	13.55
1899	11.00	11.75	14.00	15.15	16.25	19.00	20.75	22.00	23.50	24.00	24.50	25.00
1898	9.90	10.15	10.40	10.50	10.50	10.40	10.35	10.40	10.40	10.30	10.20	10.65
1897	10.50	10.65	10.50	10.00	9.35	9.35	9.00	9.05	10.00	10.25	10.25	9.90
1896	12.30	12.80	12.00	13.15	12.75	12.40	12.20	11.45	11.25	11.50	12.30	11.40
1895	10.00	10.15	10.25	10.75	11.25	12.00	14.00	14.75	17.25	15.75	14.00	12.25

Market History—

Malleable, f.o.b. Valley, 1913-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$17.50	$17.25	$17.00	$17.00	$17.00	$17.00	$17.00	$17.00	$17.00	$16.90	$16.50	$16.00
1930	19.00	19.00	19.00	19.00	19.00	19.00	18.70	18.50	18.35	17.80	17.50	17.50
1929	18.00	18.00	18.10	18.50	18.80	19.00	19.00	19.00	19.00	19.00	19.00	19.00
1928	17.25	17.25	17.25	17.25	17.25	17.00	17.00	17.00	17.10	17.35	17.90	18.00
1927	18.50	18.10	18.40	18.50	18.50	18.25	17.50	17.50	17.50	17.50	17.50	17.25
1926	20.50	20.50	20.50	19.30	19.00	18.00	17.80	17.50	17.70	18.35	19.75	19.00
1925	22.75	22.25	21.25	20.10	19.00	18.50	18.50	18.50	18.80	19.35	20.35	20.50
1924	22.00	23.00	22.50	22.20	21.30	19.75	19.00	19.00	19.50	19.50	19.75	20.50
1923	27.25	27.25	29.20	31.00	30.20	28.25	25.50	24.70	24.60	23.25	20.40	22.00
1922	19.45	19.00	19.00	20.40	24.60	24.50	25.00	28.60	34.00	32.30	29.25	26.25
1921	32.25	28.75	26.40	24.90	23.75	22.60	20.40	20.00	20.40	20.20	20.00	20.00
1920	38.95	41.60	42.35	41.60	41.60	41.85	43.40	48.25	50.50	48.25	40.40	36.00
1919	31.50	31.50	30.45	27.25	27.25	27.25	27.25	27.25	27.25	27.75	31.75	36.40
1918	33.50	33.50	34.45	34.45	34.45	34.65	34.90	34.90	34.90	34.50	34.50	34.50
1917	31.00	33.50	36.00	39.00	42.70	40.10	53.00	54.00	49.60	34.25	33.50	33.50
1916	19.00	18.65	18.50	18.50	18.50	18.50	18.50	18.50	18.55	20.15	25.85	30.75
1915	12.75	12.75	12.85	12.50	12.50	12.50	12.65	13.75	14.50	14.60	15.50	17.90
1914	13.15	13.19	14.15	13.25	13.25	13.00	13.00	13.00	13.00	12.90	12.75	12.75
1913	17.25	17.20	16.75	15.75	14.85	14.40	14.15	14.00	14.05	14.25	13.85	13.50

Basic, Valley, 1902-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov	Dec.
1931	$17.00	$16.75	$16.75	$17.00	$17.00	$17.00	$17.00	$17.00	$17.00	$16.60	$15.00	$15.00
1930	18.50	18.50	18.50	18.50	18.50	18.50	18.20	18.00	17.75	17.00	17.00	17.00
1929	17.50	17.50	17.60	18.00	18.30	18.50	18.50	18.50	18.50	18.50	18.50	18.50
1928	17.00	17.00	17.00	16.75	16.20	15.80	15.95	16.00	16.10	16.85	17.70	17.50
1927	18.50	17.85	18.50	19.00	18.10	17.90	17.50	17.50	17.15	17.00	17.00	17.00
1926	20.00	19.50	21.00	19.80	19.25	19.00	18.70	18.00	18.20	19.10	19.25	19.75
1925	21.90	22.00	21.40	20.20	19.90	18.20	18.00	18.00	18.30	18.80	19.90	20.00
1924	21.40	22.00	21.70	21.70	20.70	20.00	19.00	19.00	19.00	19.00	19.25	20.50
1923	25.90	26.10	29.80	31.00	29.80	27.35	25.15	25.00	25.00	23.75	20.80	21.00
1922	18.30	17.95	17.95	20.20	24.65	25.00	25.00	27.40	32.90	30.50	28.10	25.20
1921	29.35	26.95	24.80	23.95	22.05	21.35	19.00	19.00	19.70	19.30	19.10	18.05
1920	38.20	42.25	43.00	43.00	43.25	43.65	45.75	48.50	48.50	45.25	34.90	33.00
1919	30.00	30.00	28.95	25.75	25.75	25.75	25.75	25.75	25.75	25.75	30.15	34.20
1918	33.00	33.00	33.00	32.00	32.00	32.00	32.00	32.00	32.00	33.00	33.00	33.00
1917	30.00	30.00	32.55	38.00	41.90	49.15	52.85	49.40	41.35	33.00	33.00	33.00
1916	17.85	18.00	18.25	18.00	18.15	18.00	18.00	18.00	18.65	20.30	27.25	30.00
1915	12.50	12.50	12.50	12.50	12.65	12.70	12.95	14.35	15.00	15.00	15.50	17.50
1914	12.35	13.05	13.05	13.00	13.00	13.00	13.00	13.00	13.00	12.85	12.50	12.50
1913	16.45	16.30	16.05	15.70	14.90	14.50	14.20	14.05	14.15	13.70	13.00	12.50
1912	12.40	12.25	12.75	13.00	13.00	13.20	13.50	14.00	15.15	16.20	16.20	16.45
1911	13.30	13.60	13.75	13.75	13.40	13.05	13.00	13.00	12.70	12.50	12.30	12.45
1910	16.90	16.30	16.00	15.95	15.05	14.70	14.50	14.00	13.85	13.15	13.35	13.45
1909	15.50	15.20	14.95	14.15	14.15	14.95	15.00	15.25	15.90	16.95	17.50	17.00
1908	17.10	17.00	16.00	16.00	14.85	15.25	14.50	14.60	14.25	14.25	14.95	15.50
1907	22.00	22.00	21.00	21.00	23.00	22.25	21.95	21.45	20.10	19.70	18.75	18.00
1906	17.00	16.70	17.00	17.15	17.25	17.50	17.25	17.75	18.40	19.30	21.00	23.00
1905	15.25	15.25	15.50	15.00	15.00	14.35	14.25	14.50	14.70	15.00	16.75	16.50
1904	12.85	12.50	12.90	13.10	12.50	11.65	11.35	11.75	11.65	12.05	13.95	19.65
1903	20.95	21.25	21.10	20.60	19.35	19.15	18.55	15.35	16.00	15.10	14.15	13.10
1902	19.75	16.15	16.50	17.50	15.75	20.65	20.60	20.60	20.65	20.70	20.90	20.90

No. 2 Foundry, f.o.b. Chicago, 1895-1931

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
1931	$17.50	$17.50	$17.50	$17.50	$17.50	$17.50	$17.50	$17.50	$17.50	$17.20	$17.00	$16.60
1930	20.00	20.00	19.50	19.40	19.00	18.40	17.90	17.50	17.50	17.50	17.50	17.50
1929	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
1928	18.50	18.50	18.50	18.50	18.20	18.00	17.60	17.60	18.25	18.80	20.00	20.00
1927	20.90	20.25	20.00	20.00	20.00	20.00	20.00	19.50	19.50	18.75	18.50	18.50
1926	23.00	23.00	23.00	22.00	21.65	21.10	21.00	21.00	21.00	21.00	21.00	21.00
1925	23.80	24.00	24.00	22.60	21.25	20.25	20.30	20.50	21.10	21.60	22.75	23.00
1924	23.70	24.40	24.50	24.40	22.80	21.40	19.80	20.40	20.50	20.50	21.00	22.00
1023	28.80	29.75	31.25	32.50	32.50	31.25	28.00	27.10	26.75	25.60	23.30	23.00
1922	19.00	18.90	20.00	20.50	22.60	23.25	24.65	28.60	32.00	31.75	30.60	28.00
1921	32.75	28.65	25.80	24.25	23.00	21.10	19.15	19.60	21.75	21.50	21.00	20.00
1920	40.00	42.25	43.00	43.00	43.00	43.00	44.40	46.00	46.00	46.00	42.40	36.50
1919	31.00	31.00	29.95	26.75	26.75	26.75	26.75	26.75	26.75	31.75	31.75	38.30
1918	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	34.00	34.00	34.00
1917	30.00	31.25	35.70	39.25	43.20	51.00	55.00	55.00	49.50	33.00	33.00	33.00
1916	18.50	18.50	18.70	19.00	19.00	19.00	19.00	19.00	18.65	19.15	25.00	29.25
1915	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.40	13.80	14.45	17.10	18.00
1914	14.25	14.20	14.25	14.25	14.25	14.20	14.00	14.00	13.65	13.30	13.00	13.00
1913	18.00	18.00	17.60	17.25	16.70	16.10	15.20	15.00	15.00	15.00	15.00	14.50
1912	14.00	14.00	14.00	14.25	14.50	14.50	14.60	15.30	16.35	17.30	17.85	18.00
1911	15.00	15.00	15.00	15.00	15.00	15.00	15.00	14.50	14.50	14.50	14.00	14.00
1910	19.00	18.75	18.25	17.00	16.75	16.50	16.50	16.50	16.50	16.00	16.00	16.00
1909	17.45	16.75	16.50	16.45	16.20	16.40	16.90	17.35	18.20	18.85	19.00	19.00
1908	18.25	17.85	17.40	17.20	17.00	17.30	17.00	17.00	16.75	16.50	16.75	17.35
1907	26.00	26.50	26.75	27.50	27.40	26.50	25.40	24.50	23.60	22.60	20.60	19.00
1906	19.25	19.25	19.00	18.75	18.50	18.10	18.30	18.90	19.75	21.50	26.50	27.00
1905	17.50	17.50	17.50	17.50	17.25	16.60	16.15	16.35	16.50	17.55	18.90	19.50
1904	14.10	13.75	13.55	14.00	13.80	13.40	13.30	13.35	13.40	13.70	15.60	16.60
1903	25.00	24.00	24.00	23.00	21.70	20.50	18.50	17.50	16.85	15.90	14.50	14.30
1902	15.80	16.75	18.60	19.75	21.75	22.50	23.40	24.65	27.15	27.15	26.90	25.40
1901	14.60	14.10	15.20	15.50	15.50	15.50	15.50	15.20	15.00	15.00	15.00	15.50
1900	24.50	24.50	23.75	23.25	22.00	20.25	17.75	15.50	14.50	14.00	14.25	14.60
1899	11.25	12.00	14.25	15.00	15.25	17.00	17.00	20.00	22.00	23.00	23.50	24.50
1898	10.50	10.50	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
1897	11.00	10.75	10.75	10.75	10.25	10.00	10.00	10.00	10.25	10.75	10.75	10.50
1896	13.50	12.25	12.00	12.00	11.75	11.25	11.25	11.20	10.80	10.75	11.10	11.25
1895	9.75	9.75	9.75	10.00	10.25	10.75	12.50	13.50	13.50	14.50	14.50	14.00

Market History—

No. 2 Foundry, f.o.b. Valley, 1904-1931

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
1931	$17.00	$16.75	$16.90	$17.00	$17.00	$17.00	$17.00	$17.00	$17.00	$16.85	$16.00	$15.50
1930	18.50	18.50	18.50	18.50	18.50	17.63	18.00	18.00	17.75	17.20	17.00	17.00
1929	17.50	17.50	17.75	18.15	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50
1928	17.25	17.25	17.25	17.25	17.10	16.75	16.50	16.50	16.85	17.00	17.70	18.00
1927	18.43	18.06	18.37	18.50	18.50	18.20	17.50	17.50	17.50	17.50	17.45	17.25
1926	20.50	20.50	20.50	19.30	19.00	18.00	17.80	17.50	17.70	18.35	19.60	19.00
1925	22.25	22.00	21.25	20.20	18.85	18.50	18.50	18.75	19.20	20.40	00.00	20.50
1924	22.40	23.00	22.50	21.75	20.90	19.50	19.00	19.25	19.50	19.50	19.60	20.50
1923	27.00	27.00	29.60	31.00	30.15	27.75	25.60	24.70	24.75	23.40	22.00	22.00
1922	20.05	19.20	19.20	20.55	23.95	24.20	24.20	31.00	35.25	31.85	28.40	25.00
1921	31.10	28.20	26.20	25.05	23.80	22.50	20.30	20.10	21.20	21.20	20.05	20.35
1920	40.90	42.40	43.40	44.20	45.40	45.40	46.40	49.65	50.95	48.95	42.95	37.20
1919	31.00	31.00	29.10	26.75	26.75	28.15	28.15	28.15	29.50	34.95	33.35	38.15
1918	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	34.00	34.00	34.00
1917	32.35	34.25	37.20	39.99	42.95	51.40	55.90	54.70	49.05	33.00	33.00	33.00
1916	18.90	18.75	18.75	18.90	18.70	18.50	18.50	18.50	18.65	20.75	26.10	31.30
1915	13.25	13.25	13.25	12.95	12.75	12.75	12.85	13.95	14.75	14.85	15.90	17.50
1914	12.89	13.25	13.40	13.50	13.50	13.50	13.50	13.30	13.25	13.10	12.90	13.05
1913	17.50	17.30	16.75	15.80	14.80	14.15	13.85	13.80	14.00	13.90	13.90	13.50
1912	13.00	13.10	13.20	13.35	13.30	13.30	13.50	13.85	14.50	16.15	17.30	17.50
1911	18.75	13.75	13.85	13.85	14.75	13.60	13.50	13.50	13.50	13.50	13.15	12.80
1910	17.00	16.55	16.10	15.75	15.35	14.65	14.20	14.10	14.40	13.95	13.75	13.75
1909	15.35	15.00	14.85	14.25	14.35	14.85	15.25	15.35	16.25	17.10	17.25	17.25
1908	16.35	16.00	15.70	15.10	14.50	15.35	15.10	15.00	14.60	14.20	15.50	15.50
1907	23.30	24.00	24.00	24.00	24.50	24.50	23.15	22.55	21.30	20.05	19.15	17.05
1906	17.55	17.25	17.15	16.75	16.65	16.25	16.50	18.00	19.00	20.50	23.00	23.75
1905	16.50	16.15	16.00	16.15	15.75	14.35	14.35	14.55	14.75	15.65	16.85	17.25
1904	12.50	12.25	13.00	12.90	12.15	11.65	11.50	11.65	11.75	12.40	15.00	16.00

Southern No. 2, f.o.b. Birmingham, 1904-1931

(Local delivery)

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
1931	$14.00	$13.00	$13.00	$13.00	$12.00	$12.00	$12.00	$12.00	$12.00	$12.00	$12.00	$12.00
1930	14.70	15.00	14.50	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00
1929	16.50	16.50	16.00	15.50	15.50	15.25	14.00	14.00	14.00	14.00	14.00	14.00
1928	16.00	16.00	16.00	16.00	16.00	15.90	15.50	15.65	16.25	16.25	16.30	16.50
1927	18.50	18.00	18.00	18.00	18.00	18.00	17.43	17.25	17.25	17.25	16.00	16.00
1926	22.75	22.00	22.00	22.00	22.00	21.00	21.00	21.00	20.80	20.00	20.00	20.00
1925	20.10	20.75	21.00	20.00	20.00	19.00	18.00	18.00	18.50	19.50	21.00	21.20
1924	21.60	23.00	23.00	22.20	21.60	20.00	18.20	17.90	17.65	17.50	17.90	19.50
1923	23.30	24.50	26.50	27.00	27.00	26.75	25.00	23.60	22.75	20.20	19.25	21.00
1922	16.15	19.25	15.25	16.00	17.60	18.50	18.50	20.70	26.25	27.40	24.00	22.50
1921	33.75	27.70	25.10	23.00	22.50	21.70	20.25	19.00	19.00	19.00	18.25	17.00
1920	38.20	40.00	40.00	40.00	42.00	42.30	42.30	42.00	42.00	42.00	39.50	38.00
1919	31.00	31.00	30.00	26.75	26.25	25.25	25.00	26.75	26.75	27.45	30.65	35.15
1918	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	35.25	35.25	35.25
1917	23.00	24.50	28.00	35.80	35.75	35.75	46.00	48.00	43.50	33.50	33.50	33.50
1916	14.50	14.65	15.00	15.00	15.00	14.45	14.00	13.60	14.40	15.15	19.60	23.00
1915	9.50	9.50	9.40	9.35	9.75	9.55	9.60	11.00	11.30	11.75	13.15	14.20
1914	10.50	10.50	10.60	10.50	10.50	10.45	10.05	10.00	10.00	10.00	9.90	9.50
1913	13.70	13.50	13.00	12.50	11.75	10.60	10.50	11.00	11.00	11.00	10.75	11.00
1912	10.00	10.00	10.05	10.50	10.95	11.00	11.25	11.65	12.50	13.45	13.75	13.50
1911	11.00	11.00	11.00	11.00	10.75	10.25	10.00	10.05	10.10	10.00	9.75	10.00
1910	14.00	13.90	13.00	12.10	11.80	11.60	11.40	11.00	11.00	11.00	11.00	11.00
1909	13.00	12.70	11.75	11.00	11.00	11.30	12.30	13.00	14.00	14.50	14.50	14.00
1908	12.80	12.50	12.10	11.90	11.50	12.00	11.60	12.05	12.50	12.50	12.50	13.00
1907	23.00	23.00	22.75	22.00	21.40	21.25	20.50	19.80	18.10	17.65	16.00	14.90
1906	14.00	14.00	13.70	13.65	13.75	13.50	13.00	14.15	16.00	17.15	21.25	22.00
1905	13.50	13.50	13.50	13.25	12.75	11.85	11.00	11.65	11.75	12.50	14.00	14.00
1904	9.75	9.50	9.70	10.00	9.65	9.15	9.15	9.50	9.50	10.65	12.75	13.05

Lake Superior Charcoal, Delivered, Chicago, 1907-1931

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
1931	$27.04	$27.04	$27.04	$27.04	$27.04	$27.04	$27.04	$27.04	$25.54	$25.04	$25.04	$20.04
1930	27.04	27.04	27.04	27.04	27.04	24.04	27.04	27.04	27.04	27.04	27.04	27.04
1929	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04
1928	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04
1927	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04
1926	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	27.04	27.04	27.04
1925	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04
1924	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04
1923	33.15	33.53	35.53	36.55	36.55	36.65	36.62	32.10	32.04	30.04	28.65	29.04
1922	31.50	30.50	26.90	26.50	28.40	30.00	31.65	33.75	36.15	36.15	36.15	36.15
1921	40.25	38.50	38.50	38.50	38.50	38.50	36.87	34.30	33.25	32.50	32.25	31.50
1920	48.75	55.65	57.50	57.50	57.50	57.50	57.50	57.60	58.30	58.50	58.50	53.50
1919	38.70	38.70	38.70	33.25	31.75	31.75	31.75	32.75	32.75	33.15	35.50	41.00
1918	37.50	37.50	37.50	37.50	37.50	37.50	37.70	37.70	37.70	37.70	38.70	38.70
1917	33.75	34.50	37.55	42.25	49.25	51.80	59.50	59.50	59.50	48.50	37.50	37.50
1916	19.25	19.50	19.75	19.75	19.75	19.75	19.75	19.75	19.75	20.35	21.95	31.75
1915	15.75	15.75	15.75	15.75	15.25	15.25	15.75	15.75	15.95	16.25	17.50	19.25
1914	15.50	15.50	15.50	15.50	15.75	15.75	15.75	15.75	15.75	15.75	15.75	15.75
1913	18.25	18.00	18.00	18.00	18.00	16.75	16.75	15.00	15.00	15.75	15.50	15.50
1912	16.50	16.50	16.50	15.50	15.75	15.75	16.25	16.75	17.75	18.75	18.75	18.75
1911	17.50	17.50	17.50	17.50	17.00	17.00	17.00	17.00	17.00	17.00	16.50	16.50
1910	19.50	19.50	19.00	19.00	19.00	18.50	18.50	18.50	18.50	18.00	18.00	17.50
1909	19.50	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70
1908	22.80	21.50	21.50	21.10	19.85	19.50	19.50	19.50	19.50	19.50	19.50	19.50
1907	25.50	26.75	25.50	26.00	27.10	27.40	27.10	27.00	26.75	26.10	25.25	23.50

Market History—

Malleable, f.o.b. Chicago, 1913-1931

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
1931.....	$17.50	$17.50	$17.50	$17.50	$17.50	$17.50	$17.50	$17.50	$17.50	$17.10	$17.00	$16.60
1930.....	20.00	20.00	19.50	19.40	19.00	18.40	17.90	17.50	17.50	17.50	17.50	17.00
1929.....	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
1928.....	18.50	18.50	18.50	18.50	18.20	18.00	17.60	17.60	18.25	18.80	20.00	20.00
1927.....	20.90	20.25	20.00	20.00	20.00	20.00	20.00	19.50	19.50	18.75	18.50	18.50
1926.....	23.00	23.00	23.00	22.00	21.65	21.10	21.00	21.00	21.00	21.00	21.00	21.00
1925.....	24.00	24.00	24.00	22.70	21.25	20.25	20.50	20.50	21.10	21.60	22.75	23.00
1924.....	23.70	24.40	24.50	24.40	22.80	21.40	19.80	20.40	20.50	20.50	21.00	22.00
1923.....	28.80	29.75	31.25	32.50	32.50	31.25	28.00	27.10	26.75	25.60	23.30	23.00
1922.....	19.00	18.90	20.00	20.50	22.60	23.25	24.65	28.60	32.00	31.75	30.60	28.25
1921.....	33.25	29.00	26.25	24.75	23.50	21.20	19.15	19.40	21.75	21.20	21.00	20.00
1920.....	40.50	42.75	43.50	43.50	43.50	43.50	44.90	46.50	46.60	46.50	43.00	37.50
1919.....	31.50	31.50	30.45	27.25	27.25	27.25	27.25	27.25	27.25	28.00	32.25	38.80
1918.....	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	34.50	34.50	34.50
1917.....	30.00	31.25	35.80	39.00	43.20	50.50	55.00	55.00	49.50	33.35	33.50	33.50
1916.....	19.00	19.00	19.00	19.50	19.50	19.50	19.50	19.50	19.15	19.50	25.00	29.25
1915.....	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.40	14.20	15.10	17.40	18.00
1914.....	14.25	14.25	14.25	14.25	14.25	14.25	14.00	14.00	13.50	13.50	13.00	13.00
1913.....	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	14.40

No. 2X Foundry, Delivered, Philadelphia, 1910-1931

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
1931.....	$18.26	$18.26	$18.26	$18.26	$17.76	$17.76	$17.76	$17.51	$17.01	$16.01	$16.01	$15.76
1930.....	21.56	21.26	20.76	20.76	20.26	20.26	20.26	19.76	19.76	19.26	19.13	18.26
1929.....	22.26	22.01	22.26	22.26	22.76	22.76	22.76	22.26	22.26	22.26	22.26	21.76
1928.....	20.51	20.91	21.26	21.26	21.26	21.26	20.76	20.76	21.01	21.76	21.51	21.76
1927.....	22.76	22.26	22.26	22.26	22.26	22.01	21.51	21.26	21.01	20.66	20.51	20.26
1926.....	24.26	24.01	23.26	23.26	23.01	22.76	22.26	22.01	22.26	22.51	23.51	23.76
1925.....	25.61	25.26	24.51	23.16	21.76	21.51	21.26	21.76	21.86	22.61	24.01	24.26
1924.....	24.26	24.26	24.13	23.73	22.60	21.76	21.76	21.76	21.26	21.36	22.98	24.88
1923.....	29.56	30.10	32.00	32.75	32.75	30.60	28.00	25.80	26.20	24.50	23.00	24.26
1922.....	21.55	21.35	23.60	23.75	25.60	27.20	27.90	32.15	34.25	33.00	30.50	28.45
1921.....	35.00	31.00	27.40	26.25	26.10	26.00	23.50	21.00	21.40	22.00	22.50	22.10
1920.....	43.90	45.00	45.68	46.80	46.90	46.90	48.55	50.95	53.75	52.65	46.75	38.95
1919.....	36.15	36.15	35.10	31.00	30.10	29.60	29.50	29.60	29.95	32.00	35.85	40.75
1918.....	34.25	34.25	34.25	34.25	34.25	34.25	34.50	34.50	34.50	38.85	39.15	39.15
1917.....	30.50	31.75	36.90	41.75	43.35	47.50	54.35	53.40	47.80	34.00	34.00	34.00
1916.....	19.75	20.00	20.00	20.75	20.50	19.75	19.75	19.75	19.75	20.50	25.25	30.00
1915.....	14.25	14.25	14.25	14.25	14.00	14.25	14.50	15.25	16.25	16.50	17.50	19.25
1914.....	14.75	15.00	15.00	15.00	14.75	14.75	14.75	14.75	14.75	14.50	14.25	14.25
1913.....	18.25	18.00	17.75	17.50	17.00	16.25	15.50	15.75	16.00	15.75	15.50	15.00
1912.....	15.00	15.00	15.00	15.25	15.25	15.50	15.75	16.00	16.50	17.50	18.00	18.25
1911.....	15.50	15.50	15.75	15.50	15.25	15.00	15.00	15.00	15.00	15.00	14.85	14.75
1910.....	19.00	18.40	18.25	17.75	17.25	16.75	16.00	16.00	16.00	15.75	15.50	15.50

Basic, Delivered Eastern Pennsylvania, 1909-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931.....	$17.25	$17.25	$17.25	$17.25	$17.00	$17.00	$16.75	$16.75	$16.00	$16.00	$16.00	$16.00
1930.....	19.20	19.00	18.80	18.76	18.75	18.75	18.00	18.00	17.87	17.50	17.50	17.50
1929.....	20.15	20.50	20.25	20.25	20.50	20.25	19.85	19.85	19.85	19.75	19.75	19.75
1928.....	19.50	19.50	19.50	19.25	19.10	19.10	19.00	19.00	19.00	19.75	19.75	19.75
1927.....	21.25	21.00	21.00	20.90	20.75	20.75	20.50	19.75	19.75	19.50	19.50	19.25
1926.....	22.75	22.50	22.20	21.76	21.76	21.76	21.00	21.00	20.76	21.00	22.50	22.75
1925.....	24.25	24.20	24.05	22.65	21.45	21.50	21.50	20.55	20.50	20.50	22.70	23.00
1924.....	22.50	22.50	21.50	21.35	20.75	20.60	20.50	20.00	20.00	20.00	21.46	22.50
1923.....	27.70	28.15	29.35	30.75	30.75	28.15	27.25	25.10	25.10	24.00	22.60	23.30
1922.....	20.25	19.85	19.90	21.70	24.55	25.25	26.00	29.50	30.00	30.25	28.00	27.65
1921.....	33.35	29.95	26.20	25.00	25.00	24.70	22.25	20.70	19.50	20.50	20.90	20.25
1920.....	39.75	40.50	43.00	43.70	44.00	44.05	44.10	47.45	51.15	50.75	44.55	34.75
1919.....	33.90	33.90	32.85	29.65	28.80	25.50	26.60	27.00	27.00	27.90	33.00	35.75
1918.....	33.90	33.90	33.90	32.90	32.90	32.90	32.90	32.90	32.90	36.60	36.90	36.90
1917.....	30.15	30.50	33.80	38.25	40.80	46.40	50.75	51.00	46.50	33.50	33.50	33.50
1916.....	19.50	19.50	20.00	20.50	20.00	19.25	19.00	19.25	20.00	21.00	25.50	30.50
1915.....	13.50	13.75	14.00	13.25	13.50	13.50	13.75	15.25	17.25	17.50	17.75	18.00
1914.....	14.00	14.25	14.25	14.25	14.00	14.00	14.00	14.00	14.00	14.00	13.50	13.50
1913.....	18.25	18.00	17.50	16.50	16.50	16.00	15.25	15.00	15.25	15.25	15.00	14.25
1912.....	14.25	14.25	14.25	15.00	15.00	15.25	15.50	16.25	16.50	17.50	18.00	18.25
1911.....	14.50	15.00	15.25	15.25	14.75	14.50	14.50	14.50	14.50	14.50	14.25	14.25
1910.....	18.75	18.50	18.00	17.50	16.25	15.75	15.50	15.00	15.00	14.50	14.50	14.50
1909.....	16.40	16.10	15.85	15.05	15.00	15.85	15.90	16.15	16.80	17.85	18.36	18.15

Southern Ohio No. 2, f.o.b. Ironton, 1913-1929

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1929.....	$18.50	$18.50	(Production discontinued in this district).									
1928.....	19.00	19.00	$19.00	$19.00	$19.00	$19.00	$19.00	$19.00	$19.00	$18.60	$18.20	$18.50
1927.....	19.90	20.00	20.00	20.00	20.00	19.80	19.00	19.00	19.00	19.00	19.00	19.00
1926.....	21.40	20.60	21.00	20.40	20.00	19.50	19.50	19.90	20.00	20.00	20.00	20.00
1925.....	22.00	22.00	21.60	21.00	19.50	18.75	19.00	19.35	19.50	19.60	21.00	21.00
1924.....	22.90	24.00	23.50	23.00	22.50	20.25	19.50	19.75	20.00	20.00	20.90	22.00
1923.....	27.90	28.40	30.75	31.00	31.00	28.25	26.50	26.00	24.90	23.90	22.50	22.50
1922.....	19.60	19.15	19.00	20.30	22.70	23.25	24.15	27.00	33.75	32.40	29.25	27.00
1921.....	34.60	30.00	27.50	25.85	24.50	22.80	20.50	20.15	20.30	21.00	20.50	20.00
1920.....	39.50	43.00	43.25	43.25	44.00	44.00	44.00	46.50	46.80	46.00	44.00	37.25
1919.....	31.00	31.00	29.95	26.75	26.75	26.75	26.75	26.75	26.75	28.80	31.75	36.55
1918.....	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	34.00	34.00	34.00
1917.....	30.00	30.75	35.80	37.75	41.20	47.50	54.50	55.00	49.25	33.00	33.00	33.00
1916.....	18.30	18.50	18.30	18.50	18.50	18.15	18.45	18.40	18.15	19.40	24.00	30.00
1915.....	12.75	12.75	12.75	12.75	12.56	12.50	12.60	13.65	14.20	14.90	16.15	17.00
1914.....	13.00	13.00	13.25	13.50	13.50	13.50	13.00	13.50	13.00	13.00	12.65	12.65
1913.....	17.90	17.50	17.20	16.85	16.20	15.90	15.40	15.20	15.20	14.75	14.70	13.50

Market History—

Standard Low Phosphorus, Del. Eastern Pennsylvania, 1911-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$24.76	$24.76	$24.76	$24.76	$24.76	$23.76	$23.76	$23.76	$23.76	$23.76	$23.76	$23.76
1930	24.76	24.76	24.76	24.76	24.76	24.26	24.26	24.26	24.76	24.76	24.76	24.76
1929	24.26	24.26	24.26	24.26	24.26	24.26	24.26	24.26	24.76	24.76	24.76	24.76
1928	24.76	24.76	24.76	24.76	24.76	24.51	24.51	24.51	24.26	24.26	24.26	24.26
1927	25.76	25.76	25.76	25.76	25.76	25.76	25.76	25.26	25.26	25.26	24.76	24.76
1926	24.76	24.76	24.76	24.76	24.76	24.26	24.26	24.26	24.51	24.76	25.76	25.76
1925	26.76	26.76	26.76	26.26	25.26	25.26	25.26	25.26	24.01	24.51	24.76	24.76
1924	27.76	27.76	26.76	27.86	27.26	27.26	27.26	26.26	26.26	26.26	26.76	29.79
1923	29.75	31.35	35.45	35.45	35.80	34.80	33.80	32.80	30.50	30.50	30.00	29 76
1922	35.00	34.00	34.00	34.00	35.35	35.35	35.15	38.00	40.00	40.00	40.00	40.00
1921	47.70	46.80	46.80	44.15	43.30	43.30	43.30	43.30	43.30	43.30	43.30	35.30
1920	51.60	53.55	53.80	53.80	54.80	60.20	57.80	59.60	65.30	65.30	*65.30	*65.30
1919	51.00	51.00	49.90	46.75	45.80	42.25	41.10	40.25	40.25	40.35	43.00	47.50
1918	55.50	55.50	55.50	55.50	55.50	55.50	56.00	56.00	56.00	57.00	57.00	57.00
1917	54.50	57.50	66.70	75.50	77.00	85.00	92.50	92.50	82.00	55.50	55.50	55.50
1916	32.00	32.00	32.00	33.00	34.00	34.00	33.00	33.00	34.00	40.00	46.00	55.00
1915	19.00	19.00	20.00	20.00	20.00	20.50	21.50	23.50	24.50	28.00	30.00	32.00
1914	21.00	21.00	21.00	21.00	21.00	20.50	20.50	21.00	21.00	21.00	19.00	19.00
1913	24.50	24.50	24.00	23.50	23.50	23.50	23.50	23.00	23.00	23.00	21.50	21.00
1912	19.25	19.00	19.00	19.50	19.75	19.75	20.00	21.00	21.50	22.50	24.00	24.50
1911	21.50	21.00	21.00	21.00	21.00	20.50	20.50	20.50	20.50	20.25	19.50	19.25

*Nominal.

No. 2X, f.o.b. Virginia Furnace, 1911-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
1931	$18.25	$18.25	$18.25	$18.25	$18.25	$18.25	$18.25	$18.25	$18.25	$18.00	$18.00	$18.00
1930	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
1929	21.25	21.25	21.00	20.75	20.75	20.00	20.00	20.00	20.00	19.65	18.25	18.25
1928	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	21.25
1927	21.75	22.00	22.00	22.00	22.00	22.00	22.00	21.50	21.50	21.50	21.25	21.00
1926	23.50	23.25	23.25	23.25	23.00	23.00	22.75	22.75	23.00	22.50	22.75	23.00
1925	24.50	24.50	24.50	23.90	23.35	23.00	23.00	23.00	23.00	23.00	23.00	23.30
1924	25.00	25.75	26.00	25.50	25.50	25.50	24.50	24.50	24.50	24.50	24.50	25.00
1923	27.50	27.50	28.25	29.25	28.60	28.00	27.25	26.25	25.50	25.00	25.00	24.50
1922	21.75	22.00	22.50	22.85	23.50	24.50	26.00	26.00	33.00	33.00	31.40	27.75
1921	34.50	31.25	28.05	27.10	27.00	26.00	24.50	24.00	23.00	23.25	22.80	22.50
1920	41.25	42.75	43.25	44.25	45.75	46.25	46.75	49.25	50.25	49.75	45.75	42.05
1919	35.25	33.00	31.55	28.45	27.50	26.50	26.50	28.25	29.25	30.35	33.40	38.25
1918	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	37.50	38.00	38.00
1917	26.50	28.25	34.25	38.30	41.00	46.50	52.25	51.90	46.50	33.50	33.50	33.50
1916	17.25	18.00	18.25	18.50	18.50	18.50	18.50	18.50	17.50	18.50	23.75	27.00
1915	12.50	12.50	12.50	12.50	12.50	12.50	12.50	13.00	13.50	14.00	15.50	17.00
1914	12.75	12.75	12.75	12.75	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50
1913	16.00	15.50	15.50	15.00	14.50	13.75	13.00	13.00	13.00	13.00	13.00	12.75
1912	12.25	12.25	12.25	13.00	13.00	13.25	13.50	14.00	14.50	15.50	16.00	16.00
1911	12.75	12.75	13.00	13.00	13.00	12.25	12.25	12.25	12.25	12.25	12.25	12.25

No. 2X Foundry, f.o.b. Buffalo, 1913-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$18.00	$18.00	$18.00	$18.00	$17.60	$17.50	$17.50	$17.50	$17.50	$17.50	$17.50	$17.50
1930	19.40	19.00	19.00	19.00	19.00	19.00	19.00	18.75	19.00	18.40	18.00	18.00
1929	19.00	19.00	19.25	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
1928	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	18.00	19.00	19.00
1927	19.75	18.90	18.15	18.00	18.00	17.90	17.50	17.45	18.00	18.00	17.60	17.50
1926	21.50	21.50	21.50	21 50	21.25	20.50	19.80	20.00	20.00	20.00	20.00	20.00
1925	23.50	22.75	22.50	20.90	19.25	19.00	19.00	19.00	19.00	19.50	21.25	21.50
1924	23.10	22.75	22.00	21.50	20.50	19.90	19.30	19.10	19.50	19.60	20.90	22.00
1923	28.00	28.50	29.40	30.10	29.80	29.50	26.60	25 50	25.25	23 00	20.70	22.00
1922	19.80	19.15	18.30	20.75	23.00	23.85	25.35	31.50	33.75	31.50	27.85	26.00
1921	33.75	31.25	28.25	26.75	26.25	23.85	21.75	21.25	21.05	20.40	20.00	20.00
1920	41.50	44.60	45.15	46.25	46.25	46.25	46.25	48.75	51.25	51.25	46.00	48.25
1919	32.25	32.25	31.45	28.00	28.00	28.00	28.00	28.70	28.75	29.90	34.45	39.50
1918	33.50	33 50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	35.25	35.25	35.25
1917	35.00	35.00	38.15	40.00	42.75	49.15	53.50	54.00	49.05	33.50	33.50	33.50
1916	18.50	18.60	18.85	19.15	19.00	18.75	18.75	18.75	18.90	20.70	26.65	33.65
1915	13.15	13.05	12.55	12.75	12.75	12.75	12.80	13.70	15.15	15.80	16.70	18.00
1914	13.00	13.00	13.75	13.90	13.50	13.05	13.05	13.20	13.25	12.60	12.45	13 10
1913	17.25	17.00	17.00	16.50	15.50	14.75	14.00	14.00	14.25	14.00	14.00	14.00

Semifinished Material

Per Gross Ton f.o.b.

Wire Rods, Pittsburgh, 1912-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$35.00	$35.00	$36.00	$36.00	$35.00	$35.00	$35.00	$35.00	$35.00	$35.00	$35.00	$35.00
1930	40.00	40.00	38.00	38.00	36.40	36.00	36.00	36.00	36.00	36.00	36.00	35.50
1929	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	40.00	40.00
1928	41.50	43.50	44.00	44.00	44.00	44.00	42.00	42.00	42.00	42.00	42.00	42.00
1927	45.00	43.50	43.00	42.50	42.00	42.00	43.00	43.00	43.00	42.50	41.00	40.00
1926	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00
1925	48.00	48.00	48.00	47.75	46.00	45.25	45.00	45.00	45.00	45.00	45.00	45.30
1924	51.00	51.00	51.00	51.00	48.40	48.00	48.00	46.00	45.75	45.00	45.50	48.00
1923	45.00	47.50	47.00	46.60	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00
1922	37.00	35.75	35.80	38.00	38.00	38.00	39.50	40.00	45.00	45.00	46.50	46.50
1921	57.00	57.00	52.00	50.00	48.00	47.00	42.25	42.00	40.80	40.00	38.00	38.00
1920	52.00	56.00	62.50	70.00	70.00	70.00	70.00	70.00	70.00	75.00	72.50	57.00
1919	57.00	57.00	55.75	52.00	52.00	52.00	52.00	52.00	52.00	52.00	56.00	62.00
1918	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.25	57.50	57.50	57.50
1917	73.75	75.00	75.00	83.75	88.00	92.50	95.00	96.00	90.00	73.50	57.00	57.00
1916	46.25	50.00	51.00	55.00	60.00	60.00	58.75	55.00	55.00	55.00	64.00	69.00
1915	25.00	25.00	25.00	25.00	25.00	25.00	25.60	26.75	28.50	30.00	34.50	39.00
1914	25.50	25.90	26.00	26.00	26.00	25.50	24.80	24.50	25.60	26.00	25.75	25.05
1913	30.00	30.00	30.00	30.00	30.00	29.50	28.60	27.60	27.50	26.80	26.00	25.70
1912	24.65	25.30	25.50	25.50	25.90	25.35	25.65	26.00	26.25	27.80	29.60	30.00

Market History—

Bessemer Billets, Pittsburgh, 1895-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$30.00	$30.00	$30.00	$30.00	$30.00	$29.00	$29.00	$29.00	$29.00	$29.00	$29.00	$29.00
1930	33.80	33.00	33.00	33.00	32.20	31.25	31.00	31.00	31.00	31.00	31.00	30.50
1929	33.00	34.25	34.00	34.50	36.00	35.75	35.00	35.00	35.00	35.00	35.00	34.75
1928	33.00	33.00	33.00	33.00	33.00	32.50	32.25	32.00	32.00	32.75	33.00	33.00
1927	35.00	34.00	33.60	33.50	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00
1926	35.50	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
1925	37.40	37.60	37.75	35.80	35.35	35.00	35.00	35.00	35.00	35.00	35.00	35.00
1924	40.00	40.00	40.00	40.00	39.20	38.00	38.00	38.00	37.10	36.60	35.50	35.50
1923	37.50	38.85	44.50	46.00	45.00	42.90	42.50	42.50	42.50	41.50	41.50	40.00
1922	29.00	28.00	28.30	30.10	34.50	35.00	35.00	35.00	39.50	40.00	38.80	36.50
1921	43.50	41.00	38.50	37.75	37.00	37.00	32.25	30.00	29.80	30.00	39.00	29.00
1920	49.60	61.25	65.00	68.00	70.00	66.25	65.00	61.25	60.00	58.75	52.50	46.25
1919	43.50	43.50	42.25	38.50	38.50	38.00	37.30	38.00	38.50	39.30	40.85	45.00
1918	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50
1917	62.50	64.85	69.30	75.20	88.65	95.60	102.25	92.25	74.05	58.75	47.50	47.50
1916	34.05	35.50	41.10	46.25	46.10	43.00	42.50	45.15	47.50	48.10	53.10	59.50
1915	19.75	20.00	20.00	20.00	20.05	20.35	21.45	23.00	24.70	25.20	27.10	30.75
1914	20.00	20.90	21.05	21.05	20.00	19.80	19.55	20.05	21.00	20.40	19.25	18.85
1913	28.90	28.90	29.00	29.00	27.80	26.75	26.75	26.30	25.00	23.00	21.10	20.10
1912	20.00	20.00	19.90	20.00	21.10	21.90	22.25	22.40	23.75	25.70	26.75	27.00
1911	23.00	23.00	23.00	23.00	23.00	21.00	21.00	21.00	21.00	20.00	19.70	19.25
1910	27.87	27.50	27.50	27.00	26.10	25.50	25.00	25.00	24.50	23.40	23.00	23.00
1909	25.00	23.50	23.00	22.00	22.50	23.00	24.00	25.00	26.00	26.50	27.50	27.50
1908	28.00	28.00	28.00	28.00	28.00	26.50	25.00	25.00	25.00	25.00	25.00	25.00
1907	29.75	29.50	29.25	29.75	30.25	31.00	30.00	30.00	29.50	28.50	28.00	28.00
1906	27.00	27.50	27.65	27.75	27.00	26.25	27.00	28.00	28.50	28.50	29.00	29.75
1905	21.00	24.90	24.60	25.50	23.50	22.00	22.00	23.50	25.75	25.95	26.30	26.50
1904	23.00	23.00	23.00	23.00	22.00	21.50	21.00	20.00	19.50	19.50	21.00	21.00
1903	29.75	30.00	30.25	31.00	30.50	29.50	27.50	27.00	27.00	26.50	23.50	23.00
1902	28.05	29.80	31.35	32.25	33.90	35.20	33.50	32.10	31.50	29.80	29.00	29.25
1901	19.70	19.75	20.80	24.10	24.20	24.45	24.25	24.40	24.10	26.80	28.25	27.60
1900	35.00	35.00	35.00	34.50	29.00	27.25	22.50	18.00	17.50	17.50	19.30	19.75
1899	16.75	18.25	24.00	25.50	27.00	31.50	33.50	36.50	39.00	37.50	36.00	35.00
1898	15.00	15.00	15.25	15.25	14.85	14.75	14.75	15.45	16.10	15.75	15.25	16.00
1897	15.25	15.50	15.50	14.75	14.00	14.25	14.00	14.15	15.75	16.50	15.75	15.00
1896	17.05	17.65	17.50	18.90	19.50	19.75	19.90	91.75	19.60	20.25	20.00	17.00
1895	14.85	15.00	14.85	15.40	16.75	18.75	20.85	22.00	24.25	22.00	19.50	17.00

Bessemer Sheet Bars, Pittsburgh, 1913-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$30.00	$30.00	$30.00	$30.00	$29.75	$29.00	$29.00	$29.00	$29.00	$29.00	$29.00	$28.50
1930	33.80	33.00	33.00	33.00	32.20	31.25	31.00	31.00	31.00	31.00	31.00	30.50
1929	34.00	33.25	35.00	35.25	36.00	35.75	35.00	35.00	35.00	35.00	35.00	34.75
1928	34.00	34.00	33.70	34.00	34.00	33.50	32.25	32.20	33.00	33.00	33.60	34.00
1927	36.00	35.00	34.00	33.75	33.75	33.50	33.50	33.50	33.90	34.00	34.00	34.00
1926	36.50	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
1925	39.20	39.00	38.50	37.00	36.25	35.00	35.00	35.00	35.00	35.00	35.00	36.80
1924	42.50	42.50	42.50	42.10	40.60	40.00	39.20	38.00	37.50	37.20	37.00	37.00
1923	37.50	39.25	44.50	45.85	45.40	42.90	42.50	42.50	42.50	42.50	42.50	42.50
1922	30.00	29.00	29.40	31.50	35.00	35.00	35.00	35.00	39.50	39.85	38.80	36.50
1921	47.00	43.00	39.60	38.75	39.00	37.40	34.00	32.00	30.40	31.50	30.00	29.25
1920	53.40	65.00	70.00	70.00	75.00	70.00	70.00	70.00	68.50	63.75	56.25	47.65
1919	47.00	47.00	45.75	42.00	42.00	41.50	40.80	42.00	42.00	42.00	45.00	48.00
1918	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00
1917	60.00	62.50	67.50	72.00	88.00	101.25	105.00	96.00	82.50	65.50	57.00	57.00
1916	33.75	34.00	41.00	45.00	44.25	41.20	40.00	43.60	45.00	45.75	52.00	59.00
1915	20.00	20.00	20.00	19.60	20.00	20.35	22.00	25.00	25.80	26.50	28.50	30.80
1914	21.00	22.00	22.00	21.60	21.00	20.75	20.20	21.00	22.00	21.60	19.60	19.00
1913	28.70	29.40	29.50	29.50	28.40	27.50	27.50	27.10	25.60	23.80	21.75	21.00

Open-Hearth Sheet Bars, Pittsburgh, 1913-1931

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
1931	$30.00	$30.00	$30.00	$30.00	$29.75	$29.00	$29.00	$29.00	$29.00	$29.00	$29.00	$28.50
1930	33.80	33.00	33.00	33.00	32.20	31.25	31.00	31.00	31.00	31.00	31.00	30.50
1929	34.00	33.25	35.00	35.25	36.00	35.75	35.00	35.00	35.00	35.00	35.00	34.75
1928	34.00	34.00	33.70	34.00	34.00	33.50	32.25	32.20	33.00	33.00	33.60	34.00
1927	36.00	35.00	34.00	33.75	33.75	33.50	33.50	33.50	33.90	34.00	34.00	34.00
1926	36.50	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
1925	39.25	39.00	38.25	37.00	36.25	35.00	35.00	35.00	35.00	35.00	35.00	36.80
1924	42.50	42.50	42.50	42.10	40.60	40.00	39.20	38.00	37.50	37.20	37.00	37.00
1923	37.50	39.25	44.50	45.85	45.40	42.90	42.50	42.50	42.50	42.50	42.50	42.50
1922	30.00	29.00	29.40	31.50	35.00	35.00	35.00	35.00	39.50	39.85	38.80	36.50
1921	47.00	43.00	39.60	38.75	39.00	37.40	34.00	32.00	30.40	31.50	30.00	29.25
1920	53.40	65.00	72.50	78.00	78.75	75.00	75.00	71.25	68.50	63.75	56.25	47.65
1919	47.00	47.00	45.75	42.00	42.00	41.50	40.80	42.00	42.00	42.00	45.00	48.00
1918	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00
1917	60.00	62.50	67.50	72.00	88.00	101.25	105.00	96.00	82.50	65.50	57.00	51.00
1916	34.75	35.00	41.00	45.00	44.25	41.20	40.00	43.60	45.00	45.75	52.00	59.00
1915	20.00	20.00	20.00	19.60	20.00	20.35	22.00	25.00	25.80	26.50	28.50	30.80
1914	20.60	21.75	22.00	21.60	21.00	20.75	20.20	21.00	22.00	21.60	19.60	19.00
1913	29.20	29.90	30.00	30.00	28.80	27.50	27.50	27.10	25.60	23.80	21.75	21.00

Open-Hearth Billets, Pittsburgh, 1910-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$30.00	$30.00	$30.00	$30.00	$30.00	$29.00	$29.00	$29.00	$29.00	$29.00	$29.00	$29.00
1930	33.80	33.00	33.00	33.00	32.20	31.25	31.00	31.00	31.00	31.00	31.00	30.50
1929	33.00	34.25	34.00	34.50	36.00	35.75	35.00	35.00	35.00	35.00	35.00	34.75
1928	33.00	33.00	33.00	33.00	33.00	32.50	32.25	32.00	32.00	32.75	33.00	33.00
1927	35.00	34.00	33.60	33.50	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00
1926	35.50	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
1925	37.75	37.65	37.75	35.80	35.40	33.90	35.00	35.00	35.00	35.00	35.00	35.00
1924	40.00	40.00	40.00	40.00	39.20	38.00	38.00	38.00	37.10	36.60	35.50	35.50
1923	37.50	38.85	44.50	46.00	45.00	42.90	42.50	42.50	42.50	41.50	41.50	40.00
1922	29.00	28.00	28.30	30.10	34.50	35.00	35.00	35.00	39.50	40.00	38.80	36.50
1921	43.50	41.00	38.50	37.75	37.00	37.00	32.25	30.00	29.80	30.00	29.00	29.00
1920	49.60	61.25	66.25	70.00	70.00	66.25	65.00	61.25	60.00	58.75	52.50	46.25
1919	43.50	43.50	42.25	38.50	38.50	38.00	37.30	38.00	38.50	39.30	40.85	45.00
1918	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50
1917	60.00	62.50	67.00	72.50	85.00	93.75	100.00	93.00	73.75	58.75	47.50	47.50
1916	34.75	35.00	40.60	45.00	44.25	41.20	40.00	43.60	45.00	45.75	52.00	58.75
1915	19.50	19.50	19.50	19.50	19.50	19.85	21.50	24.00	25.60	26.50	28.00	30.20
1914	20.00	20.75	21.00	20.80	20.00	19.75	19.30	20.00	21.00	20.60	19.00	18.50
1913	28.70	29.40	29.50	29.50	28.10	26.50	26.50	26.10	25.00	23.00	20.85	20.00
1912	19.75	19.50	19.40	20.25	21.00	21.25	21.75	21.75	21.75	21.75	21.75	28.00
1911	23.00	23.00	23.00	23.00	22.00	21.00	21.00	21.00	20.25	19.50	19.75	19.25
1910	28.00	28.00	28.50	28.75	28.75	27.00	26.50	26.00	25.00	24.00	23.25	23.00

Beehive Coke

Per Net Ton

Furnace, Spot, Connellsville, 1914-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$2.50	$2.50	$2.50	$2.50	$2.45	$2.40	$2.40	$2.40	$2.40	$2.40	$2.35	$2.30
1930	3.55	2.60	2.60	2.60	2.55	2.50	2.50	2.50	2.60	2.60	2.55	2.50
1929	2.75	2.90	2.95	2.75	2.75	2.75	2.75	2.75	2.65	2.65	2.65	2.65
1928	2.70	2.65	2.60	2.60	2.55	2.60	2.60	2.75	2.75	2.80	2.75	2.75
1927	3.35	3.35	3.30	3.20	2.80	2.85	2.90	3.00	2.85	2.85	2.80	2.65
1926	6.90	7.45	3.15	3.05	2.85	2.70	2.65	2.85	3.25	3.65	4.75	3.65
1925	4.10	3.65	3.35	3.10	3.10	2.80	2.80	3.10	3.45	5.65	6.35	3.90
1924	3.80	4.00	4.05	3.55	3.25	3.15	2.85	3.00	3.00	3.00	3.00	3.35
1923	8.25	7.20	7.15	6.25	5.10	4.65	4.35	4.45	4.55	3.85	3.80	4.20
1922	2.75	2.95	3.25	4.30	6.00	6.60	10.65	13.20	11.00	10.60	7.10	6.25
1921	5.15	4.85	4.55	3.60	3.25	3.15	2.75	2.85	3.15	3.25	3.15	2.95
1920	6.00	6.00	6.00	11.20	12.00	14.50	15.20	17.75	16.90	15.15	8.40	6.25
1919	5.85	4.40	4.30	4.05	3.95	4.10	4.25	4.60	4.95	4.35	5.75	6.20
1918	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1917	9.05	11.20	9.40	7.60	8.35	11.40	12.10	13.70	12.10	6.00	6.00	6.00
1916	2.50	3.00	3.00	2.25	2.25	2.55	2.70	2.75	2.95	5.30	7.05	8.25
1915	1.60	1.55	1.50	1.50	1.55	1.55	1.70	1.50	1.60	1.70	2.10	2.10
1914	1.80	1.80	1.95	1.90	1.75	1.75	1.75	1.75	1.65	1.65	1.60	1.60

Foundry, Spot, Connellsville, 1900-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$3.30	$3.25	$3.25	$3.25	$3.25	$3.25	$3.25	$3.25	$3.25	$3.25	$3.25	$3.25
1930	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1929	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.55	3.50
1928	3.75	3.75	3.75	3.65	3.55	3.50	3.50	3.75	3.75	3.75	3.75	3.75
1927	4.25	3.85	4.15	4.05	3.80	3.90	4.00	4.00	4.00	3.75	3.75	3.65
1926	6.40	6.50	4.45	4.10	3.85	3.75	3.70	3.60	4.15	4.65	5.85	4.75
1925	5.10	4.30	3.85	3.85	3.70	3.75	3.75	3.80	4.20	5.95	6.85	5.30
1924	4.35	4.80	4.85	4.60	4.30	4.15	4.05	4.00	4.00	4.00	4.05	4.25
1923	9.00	8.60	8.15	7.80	6.10	5.50	5.15	5.20	5.70	4.80	4.85	5.15
1922	3.85	3.80	4.05	4.95	6.50	7.20	11.40	14.30	12.75	12.10	8.40	7.50
1921	6.50	6.30	6.05	5.00	4.85	4.50	4.45	4.00	4.30	4.50	4.30	4.15
1920	7.00	7.00	7.00	11.60	12.50	15.00	16.00	18.25	17.90	16.85	9.40	7.25
1919	7.05	5.15	4.80	4.55	4.35	4.70	4.80	5.20	5.90	5.60	6.95	7.15
1918	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1917	10.40	10.90	11.30	9.65	9.65	11.20	15.00	12.70	13.35	7.00	7.00	7.00
1916	3.75	3.75	3.60	3.85	3.10	3.00	3.00	3.05	3.25	4.35	8.60	9.25
1915	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.05	2.25	2.30	2.95	3.15
1914	2.50	2.40	2.40	2.40	2.40	2.35	2.30	2.25	2.25	2.20	2.10	2.00
1913	4.45	3.70	3.50	3.05	2.90	2.85	2.85	2.85	2.85	2.75	2.50	2.50
1912	2.05	2.20	2.65	2.75	2.60	2.55	2.45	2.60	2.65	3.35	4.40	4.50
1911	1.95	1.95	2.00	2.00	1.90	1.75	1.80	1.85	1.85	1.85	1.90	1.90
1910	3.00	2.90	2.80	2.55	2.30	2.15	2.10	2.15	2.10	2.05	2.00	2.00
1909	1.70	1.60	1.55	1.50	1.45	1.50	1.50	1.65	2.30	2.75	2.80	2.75
1908	1.80	1.75	1.70	1.65	1.65	1.65	1.65	1.65	1.65	1.70	1.75	1.80
1907	3.75	3.55	3.00	2.70	2.15	2.05	2.40	2.60	2.80	2.90	2.40	2.00
1906	3.00	2.40	2.35	2.60	2.55	2.40	2.55	2.70	2.75	2.85	3.20	3.60
1905	2.80	2.50	2.50	2.00	1.90	1.85	1.80	1.85	2.00	2.70	3.00	2.85
1904	1.45	1.50	1.55	1.50	1.45	1.40	1.40	1.40	1.40	1.45	1.85	2.1
1903	4.50	4.50	4.00	3.75	3.50	3.00	2.50	2.00	2.00	1.90	1.90	1.7e
1902	2.25	2.25	2.50	2.50	2.50	2.50	2.50	3.25	4.00	5.00	5.00	5.0e
1901	1.75	1.75	2.00	2.00	2.00	1.85	1.75	1.75	1.75	2.00	2.00	2.0e
1900	3.00	3.50	4.00	3.75	3.00	2.50	2.00	1.75	1.75	1.75	1.75	1.70

By-Product Foundry Coke

Per Net Ton

Chicago, Ovens, 1921-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$8.00	$8.00	$8.00	$8.00	$7.50	$7.50	$7.50	$7.50	$7.50	$7.50	$7.50	$7.50
1930	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
1929	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
1928	9.00	9.00	9.00	9.00	9.00	8.50	8.00	8.00	8.00	8.00	8.00	8.00
1927	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.30	9.00
1926	10.50	10.50	10.50	9.95	9.75	9.75	9.75	9.75	9.75	9.75	9.75	10.25
1925	10.75	10.75	10.75	10.75	10.75	10.75	9.75	9.75	9.75	10.25	10.45	10.50
1924	12.50	12.50	12.50	12.50	12.50	12.50	11.45	10.75	10.75	10.75	10.75	10.75
1923	15.00	15.00	15.00	15.00	15.00	15.00	13.50	13.50	13.50	13.50	12.50	12.50
1922	11.25	11.25	11.25	11.25	11.25	11.25	11.25	12.60	13.50	13.50	14.70	15.00
1921	.....	.....	.....	.....	.....	.....	11.25	11.25	11.25	11.25	11.25	11.25

Birmingham, Ovens, 1925-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00	$4.75
1930	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
1929	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
1928	5.00	5.00	5.00	3.95	4.80	5.00	5.00	5.00	5.00	5.00	5.00	5.00
1927	5.15	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.25	5.00
1926	5.60	5.50	5.50	5.15	5.15	5.50	5.50	5.50	5.50	5.50	5.50	5.50
1925	.....	4.90	5.00	5.00	4.65	4.50	4.50	4.50	4.60	4.75	5.70	5.70

Newark, Delivered, 1921-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
1931	$9.00	$9.00	$9.00	$9.00	$9.00	$8.70	$8.70	$8.70	$8.70	$8.70	$8.70	$8.70
1930	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
1929	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
1928	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
1927	9.84	9.59	9.59	9.59	9.59	9.59	9.59	9.59	9.59	9.59	9.59	9.59
1926	11.01	11.01	11.01	9.59	9.59	9.59	9.59	9.59	9.59	9.59	10.59	10.59
1925	10.41	10.41	10.41	10.41	10.41	10.41	10.41	10.41	10.41	10.71	11.04	11.52
1924	10.91	10.91	10.91	10.81	10.41	10.41	10.41	10.41	10.41	10.41	10.41	10.41
1923	12.84	12.84	12.84	12.84	12.34	11.84	11.34	11.34	11.34	11.41	10.91	10.91
1922	8.59	8.59	8.59	8.84	9.49	10.34	11.47	14.04	14.84	14.84	13.28	12.84
1921	.....	.....	.....	.....	.....	.....	8.84	8.84	8.84	8.84	8.84	8.84

Market History—

St. Louis, Delivered, 1921-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931.....	$9.00	$9.00	$9.00	$9.00	$9.00	$8.60	$8.50	$8.50	$8.50	$8.50	$8.50	$8.50
1930.....	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
1929.....	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
1928.....	9.75	9.75	9.75	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
1927.....	10.50	10.50	10.50	*9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75
1926.....	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.25	10.50
1925.....	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.15	9.50	9.80	10.00	10.00
1924.....	12.50	12.50	12.50	12.00	12.00	10.60	9.20	9.00	9.00	9.00	9.00	9.00
1923.....	14.00	14.25	14.20	14.00	14.00	14.00	14.00	13.00	13.00	13.00	13.00	13.00
1922.....	9.50	9.50	9.30	9.00	9.00	9.00	9.00	11.40	13.00	14.00	14.00	14.00
1921.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9.50

*Granite City previous to April, 1927.

Boston, Delivered, 1921-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931.....	$11.00	$11.00	$11.00	$11.00	$11.00	$10.50	$10.50	$10.50	$10.50	$10.50	$10.50	$10.50
1930.....	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
1929.....	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
1928.....	11.50	11.50	11.50	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
1927.....	13.50	12.65	12.50	12.50	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
1926.....	13.00	13.00	13.00	12.50	12.50	12.00	12.00	12.00	12.00	12.00	13.00	13.50
1925.....	11.50	12.00	12.00	12.00	12.00	11.50	11.50	11.65	12.00	12.00	12.90	13.00
1924.....	12.50	12.50	12.50	12.00	12.00	11.30	*11.80	11.50	11.50	11.50	11.50	11.50
1923.....	16.00	16.00	16.00	16.00	16.00	15.50	13.50	13.50	13.50	13.50	12.50	12.50
1922.....	10.40	10.25	10.15	10.15	10.15	10.15	14.00	16.30	16.50	16.50	16.20	16.00
1921.....	.....	.....	.....	.....	.....	.....	.....	.....	10.66	10.66	10.66	10.66

*From this point forward—New England delivered.

Iron and Steel Scrap

Per Gross Ton Delivered

No. 1 Cast, Pittsburgh, 1917-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931.....	$12.50	$12.50	$12.50	$12.20	$11.50	$10.85	$10.00	$10.00	$10.00	$10.00	$10.00	$10.00
1930.....	14.70	14.50	14.50	15.00	14.50	14.00	14.00	14.00	14.00	13.40	12.40	12.50
1929.....	15.30	14.50	15.20	15.45	15.00	15.00	15.00	15.00	15.00	15.00	14.90	14.50
1928.....	14.50	14.50	14.50	14.75	14.60	14.00	14.00	14.05	14.25	14.55	15.10	14.70
1927.....	16.00	15.60	15.60	16.00	15.75	15.10	15.00	15.00	15.00	14.70	14.50	14.50
1926.....	17.40	16.86	17.00	17.00	16.25	15.85	15.60	16.85	16.40	16.10	16.00	16.00
1925.....	19.50	18.85	18.35	17.80	17.00	17.00	17.00	17.10	17.50	17.40	17.75	17.50
1924.....	21.30	20.85	19.60	18.35	17.50	17.75	17.70	18.00	18.35	17.70	18.25	18.50
1923.....	22.65	24.50	27.70	27.75	25.60	23.75	21.50	21.20	21.50	19.35	18.50	20.00
1922.....	16.00	16.00	16.40	17.25	18.50	18.70	19.15	19.00	21.75	23.35	23.30	22.50
1921.....	24.50	22.00	21.00	18.25	17.50	16.00	15.00	14.85	16.30	17.50	17.10	16.25
1920.....	32.50	41.50	41.00	39.60	39.00	40.00	38.50	41.50	42.20	40.75	38.00	27.50
1919.....	25.60	21.00	21.00	21.75	21.00	21.00	21.00	24.00	24.50	25.00	28.75	30.50
1918.....	28.00	28.00	28.00	34.00	32.50	32.50	32.50	32.50	32.50	32.50	32.40	32.00
1917.....	20.00	19.75	21.50	23.35	24.60	33.25	34.75	35.00	32.50	28.00	28.50	28.50

No. 1 Cast, Eastern Pennsylvania, 1915-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931.....	$12.80	$13.00	$13.00	$13.00	$12.75	$12.50	$12.50	$12.50	$12.50	$12.50	$11.70	$11.50
1930.....	16.00	15.75	15.75	15.50	15.00	14.75	13.50	13.50	13.50	13.50	13.50	12.50
1929.....	16.75	16.75	16.50	16.50	16.50	16.50	16.50	16.50	16.25	16.25	16.00	16.00
1928.....	16.75	16.75	16.75	16.25	16.25	16.00	16.00	15.75	16.20	17.00	16.50	16.50
1927.....	17.75	17.50	17.50	17.25	17.25	16.75	16.35	16.25	16.25	16.25	16.75	16.75
1926.....	18.35	18.25	18.25	18.25	18.00	17.75	17.80	18.25	18.15	17.75	17.75	17.75
1925.....	20.75	19.35	18.50	18.20	17.10	17.75	17.75	17.75	18.65	18.75	18.75	18.75
1924.....	20.75	20.35	19.25	18.35	17.10	17.90	17.80	18.00	18.40	17.95	18.25	19.50
1923.....	23.30	24.75	28.00	26.85	24.80	22.75	21.00	20.00	20.35	19.70	19.50	20.50
1922.....	16.75	16.50	17.00	17.40	17.90	18.50	18.00	18.00	20.65	23.00	21.90	20.50
1921.....	24.15	23.35	20.50	18.15	17.90	17.50	17.50	16.50	16.50	17.50	18.00	17.50
1920.....	36.50	38.55	40.00	38.00	38.00	37.00	37.20	38.75	39.80	38.00	34.75	28.90
1919.....	28.15	25.00	22.50	22.50	21.50	22.00	23.50	24.65	25.00	25.15	28.00	31.75
1918.....	33.50	34.50	33.90	32.75	33.00	33.75	34.00	34.00	34.00	34.00	34.00	34.00
1917.....	20.75	20.15	22.50	26.75	30.00	34.75	38.35	34.10	32.90	30.00	30.50	32.00
1916.....	17.50	17.50	17.75	18.00	17.75	16.50	16.00	16.00	16.25	16.50	18.50	22.00
1915.....	12.00	12.00	12.50	12.50	12.00	12.25	12.25	13.50	14.50	14.50	15.00	15.60

No. 1 Cast, Chicago, 1918-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931.....	$10.65	$10.65	$10.65	$10.25	$9.80	$9.80	$9.80	$9.80	$9.80	$9.80	$9.00	$8.95
1930.....	15.10	15.25	15.70	15.60	14.80	14.25	13.45	13.45	13.45	12.90	10.95	10.65
1929.....	17.70	17.90	17.90	17.90	17.25	16.25	16.25	16.25	16.80	15.65	15.35	15.10
1928.....	15.75	15.75	15.65	15.65	15.90	15.95	15.95	15.95	16.30	16.55	16.90	17.35
1927.....	18.90	18.90	18.50	18.10	17.35	16.65	16.55	16.80	16.80	16.25	15.85	15.70
1926.....	19.40	18.75	18.75	18.65	18.05	18.15	19.55	19.00	18.95	17.90	18.35	18.50
1925.....	22.10	20.15	19.70	18.85	19.00	19.50	19.75	20.30	20.15	19.40	20.90	20.50
1924.....	22.10	22.25	20.80	20.00	19.00	17.75	18.60	19.00	20.25	19.20	19.25	20.75
1923.....	24.30	25.75	28.50	27.55	24.20	23.25	23.25	21.20	21.50	20.40	20.55	21.50
1922.....	14.00	14.50	15.10	16.15	17.40	17.30	17.65	19.70	23.80	24.00	22.90	22.00
1921.....	20.35	21.15	18.10	15.25	15.85	14.90	13.75	13.95	14.50	15.25	15.50	14.00
1920.....	42.50	43.25	42.20	44.10	42.50	41.75	41.20	42.00	39.30	32.75	27.65	22.10
1919.....	26.25	22.05	23.10	23.50	22.35	23.40	20.65	27.75	26.75	28.15	31.10	35.35
1918.....	30.00	30.00	33.00	32.45	30.75	31.00	31.80	33.40	34.00	34.00	32.75	29.00

Market History—

Low Phosphorus Scrap, Pittsburgh, 1917-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$17.20	$17.50	$17.50	$17.20	$16.25	$14.75	$13.50	$13.50	$14.00	$14.00	$14.00	$14.00
1930	21.50	21.75	21.85	21.60	20.50	19.50	19.00	19.35	20.00	19.30	17.60	17.50
1929	22.00	22.50	22.35	23.25	22.40	22.25	22.50	22.80	23.00	22.20	21.75	20.50
1928	18.85	18.50	18.20	18.35	18.50	18.50	18.50	19.00	20.00	20.75	21.00	21.00
1927	20.25	19.50	20.00	20.50	19.10	19.10	19.00	19.00	20.00	19.50	18.60	18.50
1926	24.00	22.00	21.50	20.90	19.50	19.75	20.30	21.75	21.60	20.25	20.40	20.30
1925	26.20	25.35	23.85	21.60	21.75	22.40	22.50	22.50	23.00	23.40	24.00	24.00
1924	23.90	24.25	23.75	20.60	19.30	21.40	21.70	22.00	22.25	22.30	23.50	25.00
1923	25.15	27.00	31.30	32.10	28.30	25.00	23.15	22.70	23.50	22.50	20.70	22.50
1922	17.50	17.10	17.10	18.60	20.00	20.60	21.00	20.60	22.90	24.85	25.00	24.50
1921	24.50	22.00	21.20	18.25	18.00	17.00	15.25	15.50	16.30	18.00	17.65	17.25
1920	31.50	33.00	32.60	30.60	30.00	30.75	30.00	33.15	34.00	33.75	31.00	25.50
1919	29.40	24.25	22.50	22.40	22.00	21.25	23.00	24.00	24.00	24.00	25.75	27.50
1918	42.20	40.00	40.00	39.00	39.00	39.00	39.00	39.00	39.00	39.00	38.60	38.50
1917	32.00	30.00	33.00	34.25	36.60	43.50	52.75	43.00	47.25	43.50	39.00	39.00

Iron Car Wheels, Chicago, 1915-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$11.25	$10.75	$10.60	$9.50	$9.25	$10.20	$10.00	$9.90	$9.50	$9.50	$9.00	$8.75
1930	14.05	14.20	14.50	14.45	13.80	13.50	13.50	13.50	13.50	13.10	12.00	11.50
1929	14.10	14.50	14.50	14.75	14.50	14.20	13.60	14.00	14.00	14.00	13.60	13.65
1928	13.70	14.25	13.95	13.50	13.45	13.10	13.00	13.00	13.00	13.10	14.05	14.05
1927	14.95	15.10	15.00	14.85	14.00	13.50	13.80	14.75	14.25	13.50	13.15	13.40
1926	18.00	16.30	16.70	16.45	15.65	15.40	16.50	16.50	15.75	14.50	14.50	14.60
1925	21.00	19.65	17.50	16.85	15.90	17.40	17.15	17.50	17.60	17.25	18.15	18.40
1924	20.60	21.25	19.90	17.50	16.60	15.65	16.40	16.90	18.40	17.90	18.60	19.50
1923	25.35	26.50	28.50	27.65	24.30	21.50	20.90	19.60	19.60	18.60	17.85	19.00
1922	15.25	14.65	15.90	18.15	18.80	18.25	18.90	20.40	23.50	24.75	24.60	23.75
1921	21.50	21.40	16.60	14.45	14.50	13.70	12.75	13.70	14.90	16.15	16.25	15.90
1920	36.25	38.75	36.15	38.50	38.25	36.00	35.70	38.40	38.80	37.25	33.25	25.80
1919	23.20	21.15	20.00	20.40	20.20	22.00	24.50	25.15	23.50	23.60	28.50	29.75
1918	30.40	30.00	30.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	27.50
1917	19.75	18.30	20.30	23.25	27.20	37.00	36.75	30.70	31.00	25.90	27.50	29.50
1916	14.75	14.05	14.05	14.00	13.15	12.50	11.90	12.00	12.25	12.25	15.95	21.00
1915	10.00	10.00	10.00	10.00	9.75	9.85	10.30	11.40	11.75	11.75	12.75	14.75

Heavy Melting Steel, Pittsburgh, 1902-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$13.00	$12.75	$12.90	$12.50	$11.25	$10.30	$10.50	$10.70	$10.80	$10.45	$10.25	$10.00
1930	16.55	16.90	16.60	16.05	15.40	15.10	14.90	15.20	15.70	14.80	12.85	12.75
1929	19.00	18.60	18.50	18.60	17.85	18.30	18.45	18.90	18.45	17.30	16.30	15.10
1928	15.35	15.05	14.75	14.85	15.00	14.70	14.10	15.00	16.55	17.35	17.35	17.50
1927	17.00	16.10	16.40	16.50	15.50	15.10	14.95	15.00	15.00	14.50	14.50	14.60
1926	18.75	17.60	17.70	16.90	16.00	15.85	16.70	17.75	17.75	17.00	17.00	17.00
1925	22.10	19.00	18.25	17.00	16.60	17.10	17.20	19.25	19.00	18.40	19.50	19.00
1924	21.10	21.60	19.75	16.60	15.40	16.25	17.30	17.75	18.60	18.20	19.85	21.00
1923	21.65	23.40	26.10	25.85	22.50	20.50	18.25	17.50	18.00	16.10	15.70	18.50
1922	14.50	13.95	14.95	16.50	17.00	17.40	16.50	17.10	19.50	21.35	20.30	20.00
1921	15.00	15.00	15.00	13.00	13.60	13.10	12.00	12.60	13.20	14.00	14.25	14.25
1920	26.50	28.15	28.00	26.40	25.50	25.30	25.70	27.75	28.60	28.00	24.00	17.20
1919	20.80	17.00	14.60	15.75	15.55	17.25	19.90	21.25	20.50	20.30	21.90	24.65
1918	30.00	30.00	30.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00
1917	23.25	21.90	23.40	28.15	28.40	40.00	40.25	36.60	35.50	31.30	29.60	30.00
1916	17.50	17.35	17.95	18.10	17.10	16.25	16.25	16.00	16.10	17.80	20.55	26.75
1915	11.55	11.60	12.00	11.90	11.75	11.75	11.75	13.38	14.25	14.00	15.30	17.40
1914	11.30	12.15	12.40	12.25	12.00	12.00	12.00	11.65	11.65	11.40	10.40	10.45
1913	15.15	14.90	14.40	14.40	14.15	13.50	12.75	12.65	12.65	12.65	11.75	11.20
1912	12.50	12.65	12.40	13.00	13.40	13.40	13.65	13.55	13.90	14.40	15.30	15.00
1911	13.50	14.30	14.40	13.50	12.75	13.15	12.90	13.40	13.15	12.25	12.15	12.50
1910	17.90	17.65	17.00	17.00	16.00	15.25	14.50	14.25	14.25	14.40	14.15	13.75
1909	16.50	16.00	14.75	14.15	14.95	15.50	15.75	16.00	16.75	17.90	18.15	17.95
1908	13.25	13.25	13.50	12.75	12.75	13.00	13.25	14.75	14.75	14.50	14.75	16.25
1907	19.25	18.75	18.25	18.25	18.15	18.65	18.50	18.25	17.75	17.50	15.45	13.75
1906	17.75	16.65	15.90	14.65	15.25	15.00	15.75	16.00	16.90	16.75	17.25	19.75
1905	16.75	16.15	16.50	16.50	15.40	14.50	14.25	14.15	15.40	16.20	17.15	18.25
1904	12.65	13.25	13.75	14.15	13.05	11.50	10.75	11.15	11.75	12.00	13.65	14.90
1903	22.25	21.75	21.25	22.15	21.65	20.50	20.25	18.75	18.25	16.00	14.50	11.50
1902	17.25	17.45	18.55	19.40	20.25	21.40	22.25	21.25	21.25	21.65	21.15	22.25

Heavy Melting Steel, Detroit (Dealers), 1926-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$9.50	$9.50	$9.15	$8.65	$8.15	$7.40	$7.55	$7.30	$6.80	$6.15	$6.00	$5.75
1930	12.25	12.00	11.85	11.70	11.30	11.00	10.85	10.95	11.15	10.95	9.95	9.55
1929	14.20	14.35	14.05	14.25	13.90	13.50	13.75	14.35	14.20	13.40	12.40	12.50
1928	11.44	11.25	11.05	10.75	11.00	10.88	10.38	10.50	11.69	12.50	13.30	13.50
1927	12.50	12.50	12.70	12.88	11.88	11.50	11.56	11.75	11.70	11.50	11.38	11.25
1926	14.75	14.75	14.75	13.35	12.50	12.00	12.80	13.50	12.94	12.75	11.94	12.20

Heavy Melting Steel, Chicago, 1909-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$10.00	$9.85	$9.75	$9.60	$8.65	$8.50	$8.50	$8.25	$7.95	$7.75	$7.65	$7.50
1930	12.65	13.25	13.20	13.00	12.55	12.05	12.00	12.00	12.25	11.55	10.20	10.00
1929	16.50	16.00	15.55	15.95	15.45	14.95	14.75	15.05	15.05	14.45	13.05	12.50
1928	12.25	12.55	12.75	12.75	12.95	12.60	12.30	12.65	12.90	13.75	14.50	14.50
1927	13.20	13.10	13.05	13.10	12.35	12.00	12.10	12.35	12.20	11.75	11.50	11.95
1926	14.95	13.75	14.00	13.20	12.25	12.65	14.20	14.00	14.10	13.05	13.00	12.90
1925	19.45	17.55	16.70	15.00	14.90	15.90	15.35	16.05	16.45	16.25	16.40	15.80
1924	17.40	18.00	16.70	14.65	13.75	13.55	14.75	15.40	16.40	16.25	17.05	18.50
1923	18.70	19.75	23.15	22.40	19.75	17.75	17.10	16.25	16.55	14.50	13.80	16.00
1922	11.20	11.15	12.05	13.55	14.65	14.45	15.15	15.85	18.15	18.50	17.40	16.75
1921	15.25	15.25	12.55	11.25	11.50	11.20	10.55	10.70	11.30	12.55	12.40	11.00
1920	24.25	25.05	24.20	23.95	23.15	22.40	23.70	24.15	24.20	21.40	18.50	16.75
1919	19.20	14.90	15.25	16.40	15.40	16.75	19.40	20.75	19.00	18.80	20.65	21.25
1918	29.70	30.00	30.00	28.65	28.90	29.00	29.00	29.00	290.0	29.00	29.00	26.50
1917	20.25	21.65	23.00	26.65	28.70	37.00	35.50	33.10	32.65	27.00	28.50	28.90
1916	15.50	15.25	16.20	16.75	16.50	15.35	14.15	14.90	15.50	16.50	19.35	23.35
1915	8.90	9.45	9.75	9.30	9.25	9.40	10.15	11.50	12.00	11.55	13.15	15.40
1914	9.20	10.00	9.80	9.50	9.95	9.75	9.50	9.50	9.40	9.00	8.25	8.25
1913	12.75	12.50	12.50	12.50	12.00	12.00	12.00	12.00	12.00	12.00	9.00	9.00
1912	11.00	10.75	11.25	12.25	12.25	12.25	11.75	12.50	13.00	14.00	13.75	13.75
1911	11.50	12.00	12.00	11.50	10.25	10.25	10.25	10.75	10.50	10.00	9.75	9.75
1910	16.00	15.50	14.50	14.50	13.00	13.00	12.50	12.25	12.25	12.25	12.00	12.00
1909	14.00	13.40	12.15	12.90	13.50	14.15	14.05	14.95	15.80	16.30	15.75	15.50

Market History—

Heavy Melting Steel, Eastern Pennsylvania, 1909-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$10.50	$10.50	$10.50	$10.00	$9.50	$8.75	$8.25	$8.55	$8.75	$8.20	$7.95	$7.50
1930	14.50	14.50	14.95	13.95	13.40	13.25	12.50	12.65	13.00	12.00	11.50	11.00
1929	16.50	16.30	16.25	17.00	16.25	16.25	16.50	16.75	16.37	15.80	15.15	14.50
1928	14.00	14.00	13.75	13.75	13.75	13.15	12.75	12.75	14.65	16.00	15.90	15.50
1927	15.60	15.00	14.75	14.75	14.45	14.25	13.75	13.75	14.00	14.00	14.00	14.00
1926	17.35	16.35	16.20	15.90	15.25	15.25	15.50	16.75	16.85	16.65	15.95	15.50
1925	20.00	17.85	16.25	15.50	15.00	15.65	16.00	16.75	17.25	17.00	17.60	17.70
1924	18.05	18.95	17.00	15.25	14.20	15.00	15.00	16.50	15.90	16.50	18.05	19.00
1923	19.70	21.20	24.85	23.50	20.40	18.65	17.25	16.00	16.85	15.50	15.50	17.00
1922	11.75	12.25	13.15	14.35	15.15	15.30	15.00	15.25	17.10	18.00	16.70	16.00
1921	15.00	14.50	13.40	11.75	11.80	11.85	11.25	11.25	11.75	12.25	12.60	12.00
1920	24.25	25.75	25.55	24.30	23.60	22.40	22.00	24.10	26.40	23.80	20.30	16.90
1919	19.00	15.25	14.25	15.85	15.30	16.15	18.85	19.60	19.00	19.55	20.80	23.90
1918	29.80	30.00	29.50	28.30	28.50	28.50	28.50	28.50	28.50	28.50	28.00	25.00
1917	21.75	20.25	23.50	25.00	26.00	32.60	37.00	32.80	30.75	26.00	26.80	28.00
1916	15.50	14.95	16.15	16.80	16.35	15.35	13.95	15.40	16.65	17.50	21.25	26.00
1915	10.00	10.50	11.00	11.25	11.50	11.50	12.00	13.50	14.50	15.00	14.50	16.00
1914	10.50	11.25	11.50	11.00	10.75	10.75	10.50	10.75	10.75	9.75	9.50	9.50
1913	14.50	13.50	13.50	13.75	12.50	12.00	11.50	11.75	12.00	11.00	10.25	10.00
1912	12.25	12.00	12.25	13.00	13.75	13.50	13.75	14.25	14.75	15.50	15.25	15.00
1911	12.75	14.25	14.25	13.75	13.25	13.00	13.00	13.25	12.75	12.00	12.25	12.50
1910	17.00	16.50	16.50	15.50	14.50	14.50	14.00	13.75	14.00	13.50	12.75	12.50
1909	17.00	15.50	13.75	13.50	14.50	15.50	16.00	17.00	17.50	18.00	18.00	17.25

Cast Borings, Pittsburgh, 1902-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$7.70	$7.70	$7.65	$7.60	$7.50	$7.75	$7.05	$7.50	$7.45	$7.50	$7.10	$6.75
1930	11.10	12.00	11.15	10.75	10.50	9.88	8.50	8.50	8.90	8.40	7.75	7.15
1929	12.55	12.25	11.50	12.15	11.55	11.85	12.10	12.50	12.40	11.80	11.15	10.75
1928	11.50	11.00	10.70	10.60	10.70	10.40	9.80	10.50	12.00	12.40	12.00	12.50
1927	12.50	12.00	12.10	12.38	11.13	10.50	10.50	11.50	11.30	11.00	11.00	11.60
1926	14.75	14.25	13.25	12.60	11.75	11.85	12.20	12.75	13.00	12.60	12.50	12.00
1925	17.20	15.60	14.50	13.60	12.85	13.40	13.50	14.50	14.85	14.10	15.10	14.80
1924	16.50	16.50	15.35	13.65	12.00	13.85	13.75	14.20	14.75	15.20	16.25	17.00
1923	18.50	19.75	21.80	21.10	21.60	17.50	15.50	15.00	16.00	13.40	12.40	14.00
1922	10.40	11.25	11.85	13.00	14.15	14.80	15.75	15.75	17.30	18.15	17.75	17.50
1921	12.50	12.35	11.60	9.70	9.50	9.00	7.60	8.00	9.05	11.60	10.65	9.55
1920	19.35	21.70	20.35	19.85	19.25	18.35	18.25	19.55	20.50	19.35	17.00	14.50
1919	14.00	11.80	10.95	12.60	11.30	11.65	13.90	16.10	15.75	15.75	17.95	18.35
1918	20.00	20.00	20.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	18.00
1917	12.35	12.25	13.20	14.70	15.45	21.10	23.90	22.00	23.55	20.70	20.00	20.00
1916	11.35	11.40	11.40	11.30	10.30	9.90	8.65	8.00	8.50	9.15	9.85	13.35
1915	8.25	8.15	8.40	8.40	8.40	8.65	8.65	9.00	9.25	9.75	10.00	10.20
1914	7.90	8.40	9.25	8.40	8.40	7.90	8.15	8.50	8.50	8.25	8.25	8.25
1913	10.40	10.40	10.40	10.40	10.40	9.25	8.40	8.15	8.15	8.40	7.75	7.45
1912	9.65	9.40	9.15	9.65	10.15	10.15	10.25	10.15	9.90	9.90	10.50	10.40
1911	8.65	8.65	9.50	8.75	8.50	8.90	8.90	9.25	9.40	8.50	8.25	8.35
1910	11.00	10.75	9.75	9.75	9.25	8.75	8.00	8.25	8.40	8.40	8.50	8.65
1909	10.75	9.75	8.25	7.75	7.25	9.65	9.75	9.50	10.65	11.15	11.25	11.00
1908	6.50	7.50	8.00	8.00	7.50	7.75	7.75	8.75	8.75	8.75	9.75	11.00
1907	12.40	12.65	13.15	13.65	13.50	13.75	13.75	13.25	13.25	13.00	9.95	6.50
1906	10.90	10.15	9.65	8.15	8.90	8.75	8.75	9.00	9.75	10.25	10.75	12.25
1905	10.75	11.25	11.15	10.90	10.15	10.00	9.15	8.40	8.90	9.75	10.50	10.90
1904	6.00	5.75	5.40	6.15	7.15	5.65	5.75	5.25	6.25	6.25	7.40	8.75
1903	11.25	11.50	11.65	11.25	11.25	.....	.....	9.00	9.00	7.00	.....	5.25
1902	8.55	9.15	9.65	10.75	11.75	12.00	11.65	10.75	14.40	15.85	11.65	11.50

Rails for Rolling, Chicago, 1908-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$13.00	$12.10	$13.00	$11.85	$11.15	$10.90	$10.50	$10.50	$10.50	$10.50	$10.00	$9.80
1930	14.65	14.80	15.00	15.00	14.85	14.55	14.50	14.50	14.50	14.10	13.10	13.00
1929	17.10	17.50	17.50	17.50	17.50	17.50	17.50	17.75	17.60	17.05	15.30	14.60
1928	15.00	15.00	14.45	14.00	14.35	14.85	14.50	15.00	15.80	16.40	16.50	16.50
1927	16.00	16.00	15.50	15.85	15.10	14.60	14.60	15.00	15.20	14.70	13.95	14.00
1926	17.55	16.30	16.50	16.00	14.95	15.10	17.10	17.25	17.25	16.65	16.50	16.50
1925	20.95	19.15	18.15	15.85	16.75	18.15	17.45	19.10	19.00	18.55	19.40	18.80
1924	18.90	20.00	19.30	17.10	15.30	14.55	15.50	16.00	17.40	17.20	18.20	19.50
1923	20.55	22.00	24.90	23.65	21.80	19.40	18.40	17.75	18.50	16.25	15.10	17.00
1922	12.50	11.50	12.85	14.25	15.50	15.40	16.00	16.75	19.40	20.50	18.90	18.00
1921	15.80	15.90	13.30	12.70	13.25	12.80	12.45	12.70	13.05	14.00	13.90	12.50
1920	33.60	34.65	32.60	32.50	31.50	32.35	34.90	38.00	38.50	34.00	24.15	17.40
1919	22.30	15.55	16.30	17.95	17.45	19.25	24.70	29.00	25.38	26.80	31.15	31.50
1918	35.30	35.00	35.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00
1917	27.25	25.65	27.25	31.90	36.80	46.00	46.25	41.90	41.25	36.00	35.70	35.65
1916	17.70	17.10	17.20	17.90	17.25	16.25	15.70	15.70	16.90	18.75	24.90	29.50
1915	9.50	9.60	10.00	9.85	10.00	10.00	10.10	11.75	13.15	13.25	14.30	16.70
1914	11.00	11.20	11.25	11.25	11.25	11.25	11.25	11.25	10.85	10.00	9.50	9.50
1913	16.25	15.50	15.00	14.50	14.00	14.00	12.00	12.50	12.00	12.00	12.00	11.50
1912	13.00	13.00	12.75	12.75	13.25	13.50	13.25	13.50	14.75	16.00	16.50	16.50
1911	13.50	13.50	13.50	13.00	12.75	12.25	12.25	12.50	12.25	12.25	12.00	12.25
1910	17.75	17.75	17.50	17.50	17.25	16.50	16.50	15.50	15.75	15.75	15.00	14.00
1909	15.80	15.05	12.80	13.20	14.65	15.50	15.55	16.00	17.20	18.00	20.25	17.70
1908	12.30	13.00	12.20	12.75	13.20	14.00	14.45	15.60	16.00	15.70	16.95	17.25

No. 1 Railroad Wrought, Chicago, 1915-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$9.50	$9.25	$9.00	$8.80	$8.40	$8.25	$8.25	$8.25	$8.00	$8.00	$8.00	$7.45
1930	13.40	13.70	13.50	13.30	12.70	11.50	11.25	11.25	11.25	10.95	10.20	10.00
1929	14.75	15.75	16.00	16.65	16.40	15.40	14.85	15.40	15.70	14.85	13.85	13.25
1928	12.65	12.40	12.45	12.45	13.05	12.70	12.30	12.40	12.90	13.50	14.25	14.50
1927	14.20	13.95	13.50	13.50	12.75	12.10	12.35	13.45	12.70	11.40	11.25	11.25
1926	15.00	14.40	14.50	14.05	12.55	12.65	14.80	14.75	14.56	14.50	13.75	13.75
1925	19.15	17.75	16.65	14.60	14.65	15.90	15.90	17.45	17.05	16.30	17.70	15.90
1924	17.50	17.50	16.05	14.80	13.60	13.25	14.80	15.75	16.70	15.95	17.10	18.75
1923	19.40	20.50	23.25	22.75	19.95	16.95	16.60	17.05	18.25	15.30	14.10	16.00
1922	11.80	11.65	12.25	13.25	14.35	14.20	15.20	16.35	19.95	20.40	18.10	17.00
1921	15.65	15.90	13.50	12.05	11.90	10.80	10.25	11.75	13.05	14.65	13.70	12.10
1920	29.00	30.75	30.70	30.70	29.50	28.00	28.10	28.50	27.50	22.50	19.55	16.60
1919	23.30	16.65	17.65	18.50	17.05	18.70	21.20	23.25	21.25	22.00	26.50	27.00
1918	35.00	35.00	35.00*	35.00	35.00	35.00	34.50	33.50	33.50	33.50	33.50	29.00
1917	23.75	24.00	25.75	29.80	32.60	41.75	39.15	35.40	36.25	31.90	30.60	31.50
1916	15.50	14.95	16.15	16.80	16.35	15.35	13.95	15.40	16.65	17.50	21.25	26.00
1915	8.80	8.90	9.00	8.55	8.75	8.75	8.90	10.10	10.75	10.70	12.75	14.90

*Quotations net tons to March 31, 1918, gross tons thereafter

Market History—

No. 1 Railroad Wrought, Eastern Pennsylvania, 1904-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$13.25	$12.50	$11.00	$11.00	$11.00	$10.50	$10.00	$9.75	$9.75	$9.50	$9.50	$9.50
1930	15.25	15.25	15.25	15.75	15.40	15.25	14.25	14.25	14.25	14.25	13.50	13.50
1929	15.50	16.25	16.25	16.25	16.25	16.25	16.25	16.25	16.13	16.00	16.25	15.25
1928	15.25	15.25	15.25	15.25	15.25	15.25	15.25	14.80	15.10	15.50	15.50	15.50
1927	17.00	17.00	17.65	16.75	16.75	16.75	16.25	15.95	15.75	15.75	15.75	15.75
1926	18.35	18.00	18.00	17.75	17.35	17.00	17.00	17.25	17.00	17.00	17.00	17.00
1925	21.50	20.50	19.50	18.40	17.60	18.20	18.25	18.25	18.25	18.25	18.75	18.75
1924	20.10	21.35	19.00	18.40	17.75	17.75	18.05	18.50	18.75	18.75	18.95	19.00
1923	22.25	24.10	27.60	27.00	24.40	22.75	18.85	17.50	19.00	18.00	17.75	19.00
1922	15.00	15.00	15.20	15.63	16.80	17.25	18.00	18.00	20.75	22.00	21.00	18.95
1921	20.00	20.00	18.20	15.50	15.00	15.00	14.25	14.00	14.20	15.40	16.00	15.75
1920	32.90	36.10	36.50	35.25	34.00	33.50	33.50	33.25	34.40	29.85	25.75	20.10
1919	29.80	25.00	24.00	21.50	21.90	22.50	24.70	27.25	27.00	27.00	27.85	30.75
1918	35.00	35.00	35.00*	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00
1917	27.00	26.75	30.00	36.00	40.80	47.85	54.05	46.20	44.50	41.80	35.35	35.00
1916	22.25	22.50	23.00	23.00	22.50	20.00	19.75	20.00	21.00	22.00	20.55	26.75
1915	11.75	12.00	12.50	12.50	12.50	12.75	13.50	15.00	16.00	16.00	17.00	20.00
1914	12.90	14.75	15.25	13.15	13.15	12.65	12.65	12.00	12.50	11.50	11.50	11.50
1913	16.25	16.25	15.25	16.25	15.50	14.75	14.70	14.25	14.25	13.75	13.75	13.35
1912	15.75	14.75	14.50	14.25	16.25	16.00	15.75	15.25	16.65	16.75	17.75	16.75
1911	16.25	16.25	17.75	16.75	15.50	15.25	15.25	15.75	15.75	14.50	14.00	14.45
1910	18.75	19.00	18.75	19.25	18.25	16.75	16.25	16.25	16.15	16.75	16.25	16.25
1909	20.25	19.25	*16.25	15.25	16.25	18.60	17.75	18.75	19.75	20.75	21.25	20.25
1908	14.25	14.25	15.25	14.75	15.50	15.75	16.00	16.50	18.25	18.25	18.50	19.75
1907	23.25	22.25	21.00	20.50	20.00	20.75	20.25	19.75	18.00	18.00	17.25	14.75
1906	22.75	21.00	19.75	20.25	20.75	18.25	17.50	18.25	20.75	22.25	22.25	23.25
1905	19.75	21.75	22.00	22.75	21.75	18.75	17.00	17.50	19.50	21.75	19.85	23.25
1904	14.65	16.00	16.50	18.25	17.75	14.00	12.75	13.25	14.40	15.25	16.25	19.00

*Quotations net tons to March 31, 1918; gross tons thereafter.

Machine Shop Turnings, Pittsburgh, 1906-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$6.00	$6.80	$7.80	$7.30	$6.75	$6.50	$6.70	$7.30	$7.50	$7.20	$7.00	$7.00
1930	11.50	11.75	11.00	11.00	10.20	9.50	8.70	8.00	8.00	7.20	6.15	6.00
1929	12.50	11.25	10.65	11.05	11.00	11.35	11.85	12.40	12.00	11.40	10.75	10.25
1928	10.60	10.15	10.15	10.25	9.90	9.20	8.80	9.65	11.00	11.25	10.85	12.00
1927	12.00	11.00	11.60	12.40	11.15	10.50	10.85	12.50	11.75	11.50	11.15	11.45
1926	14.50	13.60	13.00	12.60	11.65	11.00	11.60	12.85	13.05	12.00	11.85	11.50
1925	17.80	16.00	14.75	13.60	12.75	13.25	13.50	14.50	14.85	14.15	14.85	14.50
1924	15.50	16.10	15.00	13.25	11.10	13.00	13.50	14.00	14.75	11.40	16.00	17.50
1923	16.75	18.25	20.65	20.10	18.91	16.60	13.50	11.40	12.75	11.40	11.00	13.50
1922	9.50	9.55	10.65	12.30	13.45	13.65	13.75	13.95	15.45	15.40	16.25	15.90
1921	10.50	10.50	9.70	8.55	8.50	7.90	7.25	7.65	8.55	10.25	10.25	9.20
1920	16.75	19.25	18.40	16.85	15.15	17.65	13.55	15.75	15.80	16.00	14.75	11.60
1919	11.50	9.70	9.75	11.15	10.00	10.65	12.70	14.00	13.25	12.75	14.00	15.50
1918	20.00	20.00	20.00	19.00	18.70	18.50	18.50	18.50	18.50	18.50	18.50	17.75
1917	12.10	12.00	12.45	13.90	14.55	20.80	23.70	21.20	23.25	19.50	19.65	20.00
1916	10.35	9.55	10.75	11.20	10.35	10.05	8.55	7.75	7.25	8.00	9.10	12.75
1915	7.75	7.90	7.90	7.90	7.90	8.15	8.00	7.65	8.65	8.65	9.15	8.75
1914	6.90	7.65	7.65	8.70	8.00	7.90	7.90	7.90	7.90	8.00	7.95	7.75
1913	10.65	10.25	9.50	9.00	8.65	7.25	6.75	6.75	6.75	7.15	7.15	6.40
1912	10.25	9.75	9.50	10.00	10.25	10.90	11.00	11.00	10.65	10.90	11.50	11.25
1911	9.00	9.40	10.50	9.50	9.15	9.15	9.15	9.75	9.65	9.15	9.90	9.35
1910	13.25	13.00	12.00	11.75	11.25	10.25	9.25	9.25	9.00	9.00	9.15	9.25
1909	13.00	11.75	10.25	8.75	8.25	11.25	11.75	11.50	12.50	13.25	13.75	13.25
1908	7.75	8.75	8.75	8.50	8.25	8.25	8.25	9.00	9.50	9.50	10.50	11.75
1907	15.25	15.00	15.75	16.00	15.75	15.50	15.50	15.25	14.50	14.00	11.60	7.75
1906	.....	.....	12.50	11.75	11.25	11.25	11.25	11.50	12.40	12.25	12.40	14.75

Finished Material

Per Pound f.o.b.

Rail Steel Bars, Chicago, 1918-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c	1.50c	1.50c	1.50c
1930	1.85	1.85	1.85	1.85	1.80	1.75	1.75	1.65	1.65	1.65	1.65	1.65
1929	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.90	1.95	1.90
1928	1.80	1.80	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.90	1.95	2.00
1927	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.80	1.80	1.80
1926	2.00	2.00	2.00	2.00	2.00	1.90	2.00	2.00	2.00	2.00	2.00	2.00
1925	2.03	2.13	2.07	2.00	2.10	2.00	2.00	2.00	2.00	2.00	2.00	2.00
1924	2.30	2.30	2.30	2.30	2.20	2.15	2.10	2.05	2.05	2.00	2.00	2.00
1923	2.00	2.00	2.25	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30
1922	1.60	1.50	1.50	1.55	1.65	1.65	1.70	1.80	1.95	2.00	2.00	2.00
1921	2.50	2.50	2.50	2.15	2.00	2.00	1.95	1.85	1.85	1.75	1.70	1.65
1920	2.90	3.20	3.35	3.70	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
1919	2.80	2.80	2.80	2.55	2.45	2.45	2.45	2.55	2.55	2.55	2.75	2.85
1918	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

No. 10 Blue Annealed, Pittsburgh, 1913-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	1.90c	1.90c	1.90c	1.85c	1.85c	1.85c	1.85c	1.85c	1.85c	1.85c	1.85c	1.85c
1930	2.15	2.10	2.10	2.10	2.00	2.00	2.00	1.95	1.95	1.95	1.90	1.90
1929	2.10	2.10	2.10	2.15	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.15
1928	2.10	2.10	2.10	2.05	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.10
1927	2.25	2.20	2.20	2.20	2.25	2.25	2.25	2.25	2.25	2.15	2.10	2.10
1926	2.50	2.50	2.50	2.50	2.45	2.35	2.30	2.30	2.30	2.35	2.40	2.40
1925	2.70	2.70	2.65	2.55	2.45	2.30	2.30	2.30	2.25	2.25	2.40	2.50
1924	2.95	2.90	2.95	2.80	2.80	2.80	2.75	2.70	2.70	2.60	2.60	2.70
1923	2.50	2.50	2.70	2.80	3.00	3.00	3.00	3.00	3.00	3.00	3.00	2.90
1922	2.25	2.25	2.25	2.35	2.40	2.40	2.40	2.45	2.50	2.60	2.60	2.50
1921	3.55	3.55	3.05	2.95	3.10	3.00	2.55	2.40	2.30	2.50	2.40	2.25
1920	4.05	5.50	5.50	4.85	5.00	5.00	5.00	5.00	5.00	5.00	4.95	3.65
1919	3.90	3.90	3.80	3.55	3.55	3.50	3.50	3.55	3.55	3.55	3.55	3.55
1918	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25
1917	4.10	4.35	4.70	5.35	6.65	8.00	8.50	8.50	8.50	7.85	4.75	4.25
1916	2.45	2.60	2.85	3.00	3.05	3.10	3.00	3.00	2.95	3.15	3.30	3.90
1915	1.30	1.30	1.30	1.30	1.35	1.35	1.35	1.35	1.50	1.60	1.85	2.25
1914	1.35	1.40	1.40	1.40	1.35	1.35	1.35	1.35	1.40	1.40	1.40	1.35
1913	1.70	1.75	1.75	1.75	1.75	1.75	1.70	1.65	1.60	1.55	1.45	1.40

Market History—

Tank Plates, Pittsburgh, 1895-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	1.65c	1.65c	1.65c	1.65c	1.65c	1.65c	1.60c	1.60c	1.60c	1.60c	1.60c	1.50c
1930	1.90	1.85	1.80	1.80	1.75	1.70	1.65	1.65	1.60	1.60	1.60	1.60
1929	1.90	1.90	1.90	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.90	1.90
1928	1.80	1.85	1.90	1.85	1.85	1.85	1.85	1.85	1.90	1.95	1.95	1.90
1927	1.90	1.85	1.90	1.85	1.85	1.80	1.80	1.80	1.80	1.75	1.75	1.80
1926	1.90	1.85	1.85	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90
1925	2.00	2.10	2.10	2.00	2.00	2.00	2.00	1.90	1.80	1.80	1.85	1.90
1924	2.50	2.45	2.40	2.35	2.25	2.15	2.10	2.00	1.95	1.80	1.85	1.90
1923	2.05	2.15	2.35	2.45	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
1922	1.50	1.40	1.45	1.50	1.60	1.65	1.70	1.80	2.00	2.00	2.00	2.00
1921	2.65	2.35	2.05	2.15	2.20	2.00	1.85	1.75	1.70	1.60	1.60	1.50
1920	3.10	3.70	3.75	3.65	3.50	3.50	3.50	3.50	3.50	3.20	3.00	2.65
1919	3.00	3.00	2.90	2.65	2.65	2.65	2.65	2.65	2.55	2.65	2.65	2.70
1918	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
1917	4.25	4.30	5.00	5.45	6.40	7.75	9.45	9.20	7.50	3.25	3.25	3.25
1916	2.50	2.55	3.15	3.50	3.50	3.50	3.50	3.75	3.70	3.70	3.90	4.25
1915	1.10	1.10	1.15	1.15	1.15	1.20	1.25	1.30	1.35	1.45	1.70	1.95
1914	1.20	1.20	1.20	1.15	1.15	1.15	1.15	1.15	1.20	1.20	1.10	1.10
1913	1.50	1.50	1.50	1.50	1.50	1.45	1.45	1.45	1.40	1.35	1.30	1.20
1912	1.15	1.10	1.10	1.20	1.25	1.25	1.30	1.35	1.40	1.45	1.50	1.55
1911	1.40	1.40	1.40	1.40	1.40	1.35	1.35	1.30	1.25	1.20	1.10	1.15
1910	1.55	1.55	1.50	1.50	1.50	1.45	1.40	1.40	1.40	1.40	1.40	1.40
1909	1.60	1.45	1.30	1.20	1.25	1.30	1.35	1.40	1.50	1.50	1.55	1.60
1908	1.70	1.70	1.70	1.70	1.70	1.65	1.60	1.60	1.60	1.60	1.60	1.60
1907	1.70	1.70	1.70	1.70	1.80	1.80	1.80	1.70	1.70	1.70	1.70	1.70
1906	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.70
1905	1.45	1.50	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.60	1.60	1.60
1904	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.40	1.40	1.40	1.50
1903	1.60	1.60	1.75	1.75	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1902	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1901	1.40	1.40	1.50	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1900	2.40	2.20	2.00	1.80	1.60	1.35	1.05	1.10	1.05	1.05	1.35	1.40
1899	1.30	1.45	1.75	2.05	2.10	2.30	2.45	2.55	2.85	2.80	2.50	2.30
1898	1.00	1.00	0.95	1.00	1.10	1.10	1.10	1.10	1.15	1.10	1.10	1.15
1897	1.10	1.10	1.10	1.05	1.05	1.00	1.00	1.00	1.00	1.05	1.00	1.00
1896	1.40	1.35	1.30	1.35	1.30	1.25	1.25	1.20	1.15	1.15	1.10	1.10
1895	1.15	1.10	1.10	1.15	1.20	1.25	1.60	1.70	1.80	1.70	1.60	1.50

Steel Bars, Pittsburgh, 1901-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	1.65c	1.65c	1.65c	1.65c	1.65c	1.65c	1.60c	1.60c	1.60c	1.60c	1.60c	1.60c
1930	1.90	1.85	1.85	1.80	1.75	1.75	1.70	1.65	1.60	1.60	1.60	1.60
1929	1.90	1.90	1.90	1.95	1.95	1.95	1.95	1.95	1.95	1.90	1.90	1.90
1928	1.80	1.85	1.90	1.85	1.85	1.85	1.85	1.85	1.90	1.95	1.95	1.90
1927	1.95	1.90	1.90	1.90	1.85	1.85	1.80	1.80	1.80	1.75	1.75	1.80
1926	2.00	2.00	2.00	2.00	1.95	1.90	2.00	2.00	2.00	2.00	2.00	2.00
1925	2.10	2.10	2.10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.05	2.10
1924	2.40	2.40	2.40	2.30	2.25	2.20	2.15	2.10	2.05	2.00	2.40	2.40
1923	2.00	2.15	2.30	2.35	2.40	2.40	2.40	2.40	2.40	2.40	2.00	2.00
1922	1.50	1.40	1.45	1.50	1.60	1.65	1.70	1.80	2.00	2.00	1.55	1.50
1921	2.35	2.15	2.00	2.05	2.10	2.05	1.85	1.75	1.65	1.60	3.00	2.35
1920	3.10	3.85	3.85	3.65	3.25	3.25	3.25	3.25	3.25	3.25	2.45	2.90
1919	2.70	2.70	2.60	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.90	2.90
1918	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90
1917	3.20	3.20	3.45	3.65	3.65	4.00	4.70	4.75	4.25	2.90	2.90	2.90
1916	2.40	2.40	2.65	3.00	3.00	2.85	2.75	2.55	2.60	2.70	2.95	3.15
1915	1.10	1.10	1.15	1.20	1.20	1.20	1.30	1.35	1.30	1.45	1.70	1.90
1914	1.20	1.20	1 20	1.15	1.15	1.15	1.15	1.15	1.20	1.15	1.10	1.10
1913	1.45	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.35	1.25
1912	1.15	1.15	1.10	1.15	1.20	1.20	1.25	1.30	1.35	1.40	1.40	1.40
1911	1.40	1.40	1.40	1.40	1.40	1.25	1.25	1.20	1.15	1.10	1.10	1.10
1910	1.50	1.45	1.45	1.45	1.45	1.45	1.45	1.40	1.40	1.40	1.40	1.40
1909	1.40	1.30	1.20	1.15	1.20	1.20	1.25	1.35	1.40	1.40	1.45	1.50
1908	1.60	1.60	1.60	1.60	1.60	1.50	1.40	1.40	1.40	1.40	1.40	1.40
1907	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1906	2.00	1.75	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.55	1.60
1905	1.45	1.45	1.50	1.50	1.50	1.50	1.50	1.50	1.60	1.70	1.80	1.95
1904	1.30	1.30	1.35	1.35	1.30	1.30	1.30	1.30	1.30	1.35	1.30	1.40
1903	1.65	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.30
1902	1.60	1.50	1.50	1.65	1.80	1.80	1.70	1.75	1.75	1.70	1.60	1.70
1901	1.20	1.25	1.45	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.60	1.60

Structural Shapes, Pittsburgh, 1895-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	1.60c	1.60c	1.60c	1.65c	1.65c	1.65c	1.60c	1.60c	1.60c	1.60c	1.60c	1.50c
1930	1.90	1.85	1.80	1.80	1.75	1.70	1.65	1.65	1.60	1.60	1.60	1.60
1929	1.90	1.90	1.90	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.90	1.90
1928	1.80	1.85	1.90	1.85	1.85	1.85	1.85	1.85	1.90	1.95	1.95	1.90
1927	1.95	1.90	1.90	1.90	1.85	1.80	1.80	1.80	1.80	1.75	1.75	1.80
1926	1.90	1.90	1.90	1.90	1.90	1.90	2.00	2.00	2.00	2.00	2.00	2.00
1925	2.10	2.10	2.10	2.00	2.00	2.00	2.00	2.00	1.90	1.90	2.00	1.95
1924	2.50	2.50	2.50	2.35	2.25	2.20	2.15	2.05	2.00	2.00	2.00	2.00
1923	2.05	2.15	2.35	2.45	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
1922	1.50	1.40	1.45	1.50	1 60	1 65	1.70	1.80	2.00	2.00	2.00	1.95
1921	2.45	2.25	2.10	2.15	2.20	2.05	1.90	1.75	1.70	1.60	1.60	1.50
1920	2.65	3.15	3.25	3.25	3.25	3.25	3.25	3.15	3.10	3.10	3.00	2.45
1919	2.80	2.80	2.70	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2 45	2.50
1918	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
1917	3.10	3.25	3.45	3.70	4 00	4.00	4.50	4.50	3.75	3.00	3.00	3.00
1916	1.85	2.05	2.40	2.50	2.50	2.50	2.50	2.50	2.60	2.70	2.90	3.00
1915	1.10	1.10	1.15	1.15	1.20	1.20	1.25	1.30	1.35	1.40	1.65	1.75
1914	1.20	1 20	1.20	1.20	1.15	1 10	1 10	1.15	1.20	1.15	1.10	1.05
1913	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.40	1.35	1.30	1.25
1912	1.15	1.15	1.15	1.20	1.25	1.25	1.30	1.35	1.40	1.45	1.50	1.55
1911	1.40	1.40	1.40	1.40	1.40	1.35	1.35	1.35	1.35	1.30	1.20	1.15
1910	1.55	1.55	1.50	1.50	1.50	1.45	1 40	1.40	1.40	1.40	1.40	1.40
1909	1.60	1.45	1.30	1.20	1.25	1.30	1.35	1.40	1.50	1.50	1.55	1.60
1908	1.70	1.70	1.70	1 70	1.70	1.65	1.65	1.60	1.60	1.60	1.60	1.60
1907	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
1906	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
1905	1.50	1.55	1.60	1.60	1.60	1.60	1 60	1.60	1.70	1.70	1.70	1.70
1904	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.40	1.40	1.40	1.40
1903	1.75	1.60	1.60	1.60	1.60	1.60	1.60	1 60	1.60	1.60	1.60	1.60
1902	1.60	1.60	1.70	1.85	2.00	2.25	2.25	2.35	2.25	2.15	2.10	2.00
1901	1.50	1.50	1.50	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1900	2.25	2.25	2.25	2.25	2.25	2.05	1.90	1.75	1.70	1.70	1.70	1.70
1899	1.30	1.30	1.40	1.50	1.50	1.75	1.95	2.05	2.25	2.25	2.25	2.25
1898	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.20	1.20	1.20	1.20	1.20
1897	1.55	1.55	1.55	1.55	1.30	1.05	1.00	1.00	1.00	1.10	1.10	1.10
1896	1.45	1.50	1.45	1.45	1.50	1.55	1.55	1.55	1.55	1.55	1.50	1.45
1895	1.25	1.20	1.20	1.20	1.20	1.35	1.50	1.60	1.65	1.60	1.60	1.55

Market History—

Bar Iron, Chicago, 1907-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	1.70c	1.75c	1.70c	1.70c	1.80c	1.70c	1.70c	1.70c	1.70c	1.70c	1.65c	1.60c
1930	2.00	1.95	1.95	1.95	1.90	1.90	1.90	1.80	1.75	1.75	1.70	1.70
1929	2.00	2.05	2.00	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.00	2.00
1928	1.90	1.95	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
1927	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2 00	2.00	1.90	1.85	1.90
1926	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
1925	2.00	2.00	2.10	2.10	2.10	2.05	1.95	1.90	1.90	1.90	2.00	2.00
1924	2.40	2.40	2.40	2.35	2.30	2.25	2.20	2.15	2.15	2.10	2.10	2.00
1923	2.35	2.45	2.55	2.60	2.60	2.60	2.55	2.50	2.40	2.40	2.40	2.40
1922	1.60	1.60	1.60	1.65	1.65	1.75	1.80	2.00	2.25	2.50	2.50	2.35
1921	2.75	2.65	2.65	2.50	2.45	2.25	1.95	1.75	1.75	1.75	1.70	1.65
1920	3.15	3.45	3.50	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.50
1919	3.15	2.95	2.85	2.55	2.50	2.55	2 65	2.65	2.65	2.70	2.75	2.75
1918	3.50	0	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1917	3.00	3.00	3.00	3.20	3.40	4.00	4.50	4.50	4.50	4.50	4.00	4.00
1916	1.85	1.90	2.20	2.35	2.35	2.35	2.36	2.35	2.35	2.35	2.50	2.60
1915	0.95	1.05	1.10	1.15	1.15	1.15	1.20	1.25	1.30	1.35	1.50	1.70
1914	1.15	1.20	1.15	1.15	1.10	1.10	1.05	1.05	1.05	1.05	0.95	0.95
1913	1.60	1.60	1.60	1.55	1.55	1.55	1.50	1.45	1.35	1.25	1.15	1.15
1912	1.15	1.15	1.15	1.15	1.25	1.25	1.35	1.40	1.45	1.50	1.55	1.55
1911	1.30	1.30	1.25	1.20	1.20	1.20	1.20	1.20	1.20	1.15	1.15	1.15
1910	1.60	1.60	1.55	1.55	1.50	1.45	1.40	1.40	1.40	1.35	1.35	1.30
1909	1.50	1.50	1.40	1.30	1.25	1.30	1.35	1.40	1.50	1.50	1.55	1.60
1908	1.60	1.55	1.55	1.55	1.55	1.55	1.50	1.50	1.50	1.50	1.50	1.50
1907	1.80	1.80	1.80	1.80	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75

No. 24 Black Sheets, Pittsburgh, 1907-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	2.35c	2.35c	2.35c	2.25c	2.25c	2.15c	2.40c	2.40c	2.40c	2.40c	2.40c	2.40c
1930	2.70	2.65	2.65	2.65	2.55	2.55	2.55	2.50	2.40	2.40	2.35	2.35
1929	2.85	2.85	2.85	2.90	2.95	2.95	2.85	2.85	2.85	2.80	2.75	2.75
1928	2.80	2.85	2.85	2.75	2.75	2.70	2.65	2.65	2.70	2.70	2.80	2.85
1927	2.95	2.90	2.90	2.80	2.90	3.00	3.00	3.00	3.00	2.95	2.80	2.75
1926	3.35	3.35	3.25	3.25	3.20	3.10	3.10	3.10	*3.05	3.05	3.10	3.10
1925	3.50	3.50	3.40	3.35	3.25	3.15	3.15	3.15	3.10	3.10	3.25	3.35
1924	3.75	3.75	3.75	3.70	3.65	3.65	3.60	3.50	3.45	3.40	3.45	3.50
1923	3.35	3.35	3.55	3.85	3.85	3.85	3.85	3.85	3.75	3.75	3.75	3.75
1922	3.00	3.00	3.00	3.10	3.15	3.15	3.15	3.25	3.40	3.50	3.35	3.30
1921	4.35	4.20	3.90	3.90	4.00	3.90	3.35	3.05	2.80	3.00	2.95	3.00
1920	5.00	6.00	6.00	6.00	7.00	7.00	7.00	7.00	7.00	7.00	6.05	4.45
1919	4.70	4.70	4.60	4.35	4.35	4.30	4.30	4.35	4.35	4.35	4.35	4.35
1918	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
1917	4.55	4.55	5.05	5.75	7.00	8.15	9.00	9.00	8.75	7.75	5.30	5.00
1916	2.55	2.60	2.75	2.90	2.95	2.90	2.90	2.75	2.85	3.20	3.65	4.45
1915	1.80	1.80	1.80	1.80	1.80	1.80	1.75	1.85	1.90	2.05	2.20	2.50
1914	1.85	1.95	1.95	1.90	1.85	1.80	1.80	1.90	1.95	1.95	1.90	1.80
1913	2.30	2.35	2.35	2.35	2.35	2.30	2.25	2.20	2.10	2.00	1.95	1.90
1912	1.90	1.85	1.80	1.85	1.95	1.95	2.00	2.05	2.10	2.20	2.25	2.25
1911	2.20	2.20	2.20	2.15	2.15	2.00	2.00	1.95	1.90	1.85	1.85	1.90
1910	2.40	2.40	2.40	2.35	2.30	2.25	2.20	2.20	2.1	2.15	2.15	2.15
1909	2.40	2.40	2.30	2.20	2.20	2.20	2.20	2.20	2.4	2.30	2.40	2.40
1908	2.55	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2	2.50	2.50	2.50
1907	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2 0	2.60	2.60	2.60

*No. 28 gage before Sept. 1, 1926.

Automobile Sheets, Pittsburgh, 1922-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	3.30c	3.30c	3.30c	3.15c	3.05c	3.10c	3.10c	3.10c	3.10c	3.10c	3.10c	3.00c
1930	3.90	3.90	3.90	3.80	3.80	3.60	3.60	3.60	3.60	3.45	3.35	3.30
1929	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.05	4.00	4.00
1928	4.00	4.10	4.15	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.05	4.10
1927	4.20	4.15	4.15	4.15	4.25	4.25	4.25	4.25	4.25	4.15	4.15	4.10
1926	4.50	4.40	4.40	4.35	4.30	4.25	4.20	4.25	*4.25	4.25	4.25	4.25
1925	4.75	4.70	4.55	4.45	4.35	4.30	4.25	4.25	4.25	4.35	4.45	4.50
1924	5.35	5.35	5.30	5.35	5.10	5.10	5.10	4.85	4.75	4.60	4.65	4.70
1923	4.85	4.95	5.35	5.50	5.50	5.50	5.35	5.35	5.35	5.35	5.35	5.35
1922	....	....	....	....	....	....	....	....	....	....	4.85	4.85

*No. 22 gage previous to September 1926; No. 20 gage since.

No. 24 Galvanized Sheets, Pittsburgh, 1903-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	2.90c	2.90c	2.90c	2.85c	2.80c	2.80c	2.90c	2.90c	2.90c	2.90c	2.90c	2.90c
1930	3.35	3.30	3.30	3.30	3.25	3.20	3.15	3.10	3.00	3.00	2.95	2.90
1929	3.60	3.60	3.60	3.65	3.70	3.65	3.60	3.55	3.50	3.50	3.45	3.40
1928	3.65	3.65	3.75	3.65	3.65	3.55	3.50	3.50	3.50	3.50	3.55	3.60
1927	3.80	3.70	3.70	3.65	3.80	3.80	3.85	3.85	3.85	3.80	3.70	3.60
1926	4.60	4.60	4.60	4.60	4.55	4.30	4.30	4.30	*3.95	3.90	3.95	3.95
1925	4.75	4.75	4.70	4.55	4.35	4.20	4.20	4.20	4.20	4.25	4.50	4.60
1924	4.95	4.90	4.90	4.85	4.80	4.80	4.70	4.60	4.60	4.60	4.60	4.60
1923	4.35	4.35	4.65	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.85	4.90
1922	4.00	4.00	4.00	4.10	4.15	4.15	4.15	4.25	4.40	4.50	4.35	4.35
1921	5.70	5.50	5.05	4.90	5.00	4.90	4.35	4.05	3.80	4.00	3.95	4.00
1920	6.35	7.00	7.25	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.35	5.85
1919	6.05	6.05	5.95	5.70	5.70	5.65	5.65	5.70	5.70	5.70	5.70	5.70
1918	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25
1917	6.55	6.80	6.80	7.55	8.80	9.95	10.25	10.25	9.70	8.80	6.50	6.25
1916	4.75	4.75	4.80	4.85	4.85	4.80	4.35	4 25	4.20	4.45	5.05	6.25
1915	2.75	3.00	3.40	3.30	3.40	4.45	4.55	3.95	3.65	3.50	3.90	4.75
1914	2.85	2.95	2.95	2.90	2.80	2.75	2.75	2.85	2.95	2.95	2.85	2.80
1913	3.45	3.50	3.50	3.50	3.40	3.40	3.30	3.25	3.15	3.05	2.95	2.85
1912	3.20	3.20	3.00	3.00	3.10	3.10	3 10	3.30	3.50	3.50	3.50	3.50
1911	3.20	3.20	3.20	3.20	3.20	3.00	3.00	3 00	2.80	3.00	3.00	3.20
1910	3.70	3.70	3.70	3.70	3.50	3.20	3.20	3.20	3.20	3.20	3.20	3.20
1909	3.40	3.30	3.40	3.40	3.40	3.50	3.50	3.50	3.60	3.60	3.70	3.70
1908	3.70	3.70	3.70	3.60	3.50	3.50	3.50	3.50	3.30	3.30	3.20	3.20
1907	4.00	4.00	4.00	3.80	3.80	3.80	3.70	3.70	3.60	3.60	3.50	3.50
1906	3.60	3.60	3.70	3.80	3.80	3.80	3.80	3.90	3.80	4.00	4.00	4.00
1905	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1904	3.50	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.50
1903	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.50	3.50	3.50

*No. 28 gage before Sept. 1, 1926.

Market History—

Tin Plate, Pittsburgh, 1903-1931

Per Base Box, 100 lbs., Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00	$4.75	$4.75	$4.75
1930	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.00	5.00	5.00
1929	5.35	5.35	5.35	5.35	5.35	5.35	5.35	5.35	5.35	5.35	5.35	5.35
1928	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.30	5.35
1927	5.50	5.50	5.50	5.50	5.50	5.45	5.50	5.50	5.50	5.30	5.30	5.25
1926	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50
1925	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50
1924	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50
1923	4.75	4.75	4.95	4.95	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50
1922	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75
1921	7.00	7.00	7.00	6.65	6.25	6.25	5.65	5.25	5.15	5.00	4.80	4.75
1920	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1919	7.35	7.35	7.25	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1918	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75
1917	6.90	7.00	7.50	7.50	7.90	9.25	10.00	10.00	10.00	10.00	8.20	7.75
1916	3.75	3.75	4.15	4.70	5.15	5.55	5.80	6.00	5.60	5.75	6.05	6.50
1915	3.10	3.10	3.10	3.20	3.20	3.10	3.10	3.10	3.10	3.10	3.35	3.60
1914	3.40	3.40	3.40	3.40	3.40	3.30	3.25	3.45	3.55	3.35	3.15	3.20
1913	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.55	3.50	3.40
1912	3.40	3.40	3.50	3.50	3.50	3.50	3.50	3.70	3.70	3.70	3.70	3.60
1911	3.70	3.70	3.70	3.60	3.60	3.60	3.60	3.50	3.50	3.40	3.40	3.40
1910	3.50	3.50	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60
1909	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.50	3.50	3.50
1908	3.60	3.60	3.60	3.60	3.60	3.50	3.50	3.50	3.50	3.50	3.50	3.40
1907	3.90	3.90	3.90	3.90	3.80	3.80	3.70	3.70	3.70	3.60	3.60	3.60
1906	3.50	3.50	3.50	3.60	3.70	3.70	3.80	3.90	3.90	3.90	4.00	4.00
1905	3.50	3.50	3.50	3.50	3.50	3.40	3.40	3.40	3.30	3.30	3.40	3.50
1904	3.40	3.40	3.30	3.30	3.20	3.20	3.20	3.10	3.30	3.40	3.50	3.50
1903	3.80	3.80	3.90	3.90	3.80	3.80	3.70	3.70	3.60	3.60	3.60	3.50

Plain Wire, Pittsburgh, 1912-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	2.20c	2.20c	2.20c	2.20c	2.20c	2.20c	2.20c	2.20c	2.20c	2.20c	2.20c	2.20c
1930	2.40	2.40	2.40	2.40	2.35	2.30	2.30	2.30	2.30	2.30	2.30	2.25
1929	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.45	2.40	2.40	2.40
1928	2.40	2.45	2.50	2.50	2.50	2.50	2.45	2.40	2.40	2.40	2.40	2.50
1927	2.50	2.45	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
1926	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
1925	2.60	2.60	2.60	2.55	2.50	2.45	2.50	2.50	2.50	2.50	2.50	2.50
1924	2.75	2.75	2.75	2.75	2.70	2.65	2.60	2.60	2.55	2.50	2.50	2.60
1923	2.45	2.60	2.65	2.70	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1922	2.25	2.20	2.25	2.25	2.25	2.25	2.25	2.25	2.40	2.45	2.45	2.45
1921	3.25	3.20	3.00	3.00	3.00	2.75	2.50	2.50	2.60	2.60	2.60	2.25
1920	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.20	3.25	3.25	3.25
1919	3.25	3.25	3.20	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.15	3.25
1918	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
1917	2.95	2.95	3.10	3.20	3.45	3.60	3.95	3.95	3.95	3.85	3.25	3.25
1916	1.95	2.10	2.25	2.25	2.45	2.45	2.45	2.55	2.55	2.60	2.80	2.95
1915	1.30	1.35	1.40	1.40	1.35	1.35	1.40	1.40	1.55	1.60	1.70	1.90
1914	1.35	1.40	1.40	1.40	1.35	1.30	1.30	1.35	1.35	1.40	1.40	1.30
1913	1.55	1.55	1.55	1.60	1.60	1.60	1.50	1.45	1.45	1.40	1.40	1.35
1912	1.35	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.50	1.55	1.55	1.55

Wire Nails, Pittsburgh, 1907-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	$1.90	$1.90	$1.90	$1.90	$1.90	$1.80	$1.85	$1.90	$1.90	$1.90	$1.90	$1.90
1930	2.35	2.30	2.30	2.25	2.15	2.15	2.10	2.05	2.00	2.00	1.95	1.90
1929	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.50	2.45	2.40	2.40
1928	2.50	2.60	2.65	2.60	2.60	2.60	2.55	2.55	2.55	2.55	2.55	2.65
1927	2.65	2.60	2.55	2.55	2.50	2.55	2.55	2.55	2.55	2.55	2.50	2.50
1926	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65
1925	2.85	2.85	2.85	2.20	2.25	2.75	2.65	2.65	2.65	2.65	2.65	2.65
1924	3.00	3.00	3.00	3.00	2.95	2.90	2.85	2.85	2.80	2.75	2.75	2.85
1923	2.70	2.75	2.90	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
1922	2.50	2.45	2.40	2.40	2.40	2.40	2.40	2.40	2.65	2.70	2.70	2.70
1921	3.25	3.00	3.00	3.25	3.25	3.00	2.75	2.75	2.90	2.90	2.90	2.50
1920	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
1919	3.50	3.50	3.45	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.45	3.50
1918	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1917	3.00	3.00	3.15	3.20	3.50	3.65	4.00	4.00	4.00	3.90	3.50	3.50
1916	2.15	2.20	2.40	2.40	2.50	2.50	2.50	2.60	2.60	2.65	2.85	3.00
1915	1.50	1.55	1.60	1.60	1.55	1.55	1.60	1.60	1.70	1.75	1.85	2.00
1914	1.55	1.60	1.60	1.60	1.60	1.55	1.55	1.55	1.60	1.60	1.60	1.50
1913	1.75	1.75	1.75	1.80	1.80	1.80	1.75	1.70	1.65	1.60	1.60	1.60
1912	1.55	1.60	1.60	1.60	1.60	1.60	1.60	1.65	1.70	1.70	1.75	1.75
1911	1.70	1.75	1.80	1.80	1.75	1.80	1.70	1.70	1.65	1.65	1.55	1.55
1910	1.85	1.85	1.85	1.85	1.80	1.80	1.70	1.70	1.70	1.70	1.65	1.70
1909	1.95	1.95	1.95	1.95	1.60	1.70	1.70	1.80	1.80	1.80	1.80	1.85
1908	2.05	2.05	2.05	2.05	2.05	2.00	1.95	1.95	1.95	1.95	1.95	1.95
1907	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.05	2.05	2.05	2.05

Cold-Rolled Strip, Pittsburgh, 1910-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931	2.25c	2.25c	2.25c	2.20c	2.15c	2.15c	2.15c	2.15c	2.15c	2.15c	2.10c	2.05c
1930	2.70	2.65	2.60	2.55	2.50	2.45	2.45	2.40	2.35	2.35	2.35	2.25
1929	2.85	2.85	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1928	3.00	3.10	3.15	*2.75	2.75	2.75	2.75	2.70	2.75	2.75	2.80	2.85
1927	3.10	2.90	2.95	3.00	3.00	3.25	3.25	3.25	3.15	2.95	2.95	3.00
1926	3.90	3.90	3.90	3.85	3.75	3.70	3.65	3.50	3 50	3.50	3.25	3.25
1925	4.10	4.15	4.05	4.00	3.85	3.65	3.75	3.75	3.75	3.75	3.90	3.90
1924	5.00	4.80	4.80	4.75	4.50	4.50	4.35	4.20	4.00	4.00	4.00	4.15
1923	4.50	4.65	4.80	5.15	5.25	5.25	5.00	5.00	5.00	5.00	5.00	4.75
1922	3.50	3.50	3.50	3.60	3.70	3.95	4.00	4.00	4.25	4.50	4.50	4.50
1921	6.25	6.25	5.65	5.50	5.50	5.00	4.40	3.90	3.75	3.75	3.80	3.75
1920	5.65	7.00	8.80	8.50	8.50	8.50	8.50	8.50	7.35	8.50	8.00	6.85
1919	6.25	6.25	6.10	5.65	5.65	5.65	5.65	5.65	5.65	5.65	5.65	5.65
1918	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50
1917	6.50	6.50	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	6.50	6.50
1916	4.25	4.65	5.50	6.00	6.00	6.00	6.00	6.00	6.00	6.50	6.50	6.50
1915	2.75	2.75	2.75	2.75	2.75	2.85	2.85	3.00	3.10	3.25	3.50	3.75
1914	3.05	3.05	3.05	3.05	3.05	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1913	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.05
1912	2.95	2.95	2.95	2.95	3.00	3.05	3.05	3.05	3.05	3.15	3.20	3.25
1911	2.95	2.95	3.25	3.25	3.25	2.95	2.95	2.95	2.95	2.95	2.95	2.95
1910	....	....	....	....	....	....	2.95	2.95	2.95	2.95	2.95	2.95

*April, 1928, and subsequently, prices are for 3 tons or over, instead of less than 3 tons.

Market History—

Cold Finished Steel Bars, Pittsburgh, 1920-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931.....	2.10c	2.10c	2.10c	2.10c	2.10c	2.10c	2.10c	2.10c	2.10c	2.10c	2.10c	2.00c
1930.....	2.15	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.05	2.00
1929.....	2.20	2.20	2.25	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.20	2.20
1928.....	2.30	2.25	2.25	2.20	2.20	2.15	2.10	2.15	2.20	2.20	2.20	2.20
1927.....	2.35	2.35	2.40	2.40	2.40	2.35	2.30	2.30	2.20	2.15	2.10	2.10
1926.....	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.45	2.40	2.40
1925.....	2.80	2.80	2.75	2.70	2.70	2.60	2.55	2.50	2.50	2.45	2.50	2.50
1924.....	3.00	3.00	3.00	3.00	3.00	2.90	2.85	2.80	2.75	2.70	2.70	2.80
1923.....	2.50	2.65	2.85	3.00	3.25	3.25	3.25	3.25	3.25	3.25	3.00	2.90
1922.....	2.00	1.90	1.85	1.85	2.00	2.00	2.05	2.15	2.50	2.50	2.50	2.50
1921.....	3.60	3.60	3.10	3.05	3.10	3.00	2.75	2.50	2.40	2.25	2.15	2.00
1920.....	3.65	3.85	4.50	5.25	4.40	4.50	4.10	4.55	4.25	4.10	4.00	3.60

Hot-Rolled Strip, Wide, Pittsburgh, 1917-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931.....	1.55c	1.55c	1.55c	1.55c	1.50c	1.50c	1.55c	1.55c	1.55c	1.55c	1.50c	1.45c
1930.....	1.85	1.80	1.80	1.70	1.70	1.70	1.65	1.65	1.65	1.60	1.55	1.55
1929.....	1.80	1.85	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90
1928.....	1.85	1.85	1.90	1.90	1.85	1.85	1.90	1.85	*1.80	1.80	1.80	1.80
1927.....	2.20	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.00	1.90
1926.....	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30
1925.....	2.35	2.40	2.35	2.20	2.20	2.20	2.20	2.20	2.20	2.25	2.30	2.30
1924.....	3.00	2.95	2.85	2.75	2.60	2.55	2.50	2.50	2.45	2.35	2.25	2.35
1923.....	2.75	2.85	3.10	3.30	3.30	3.30	3.20	3.15	3.10	3.00	3.00	2.75
1922.....	2.00	1.80	1.80	1.95	2.05	2.35	2.50	2.50	2.75	2.90	2.90	2.80
1921.....	3.30	3.30	2.85	2.75	2.75	2.70	2.50	2.30	2.15	2.15	2.25	2.00
1920.....	3.70	4.80	5.25	5.45	5.50	5.50	5.50	5.50	5.50	5.50	5.00	3.90
1919.....	3.80	3.55	3.30	3.25	3.05	3.05	3.10	3.30	3.30	3.30	*3.30	*3.30
1918.....	4.50	4.50	4.50	4.50	4.25	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1917.....	....	....	....	....	....	7.25	7.25	7.25	7.00	7.00	5.25	4.50

*Firstquarter 1920 delivery.

Hot-Rolled Strip, Narrow, Pittsburgh, 1928-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931.....	1.65c	1.65c	1.65c	1.65c	1.60c	1.60c	1.65c	1.65c	1.65c	1.65c	1.60c	1.55c
1930.....	1.95	1.90	1.90	1.80	1.80	1.80	1.75	1.75	1.75	1.70	1.65	1.65
1929.....	1.90	1.95	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
1928.....	2.10	2.10	2.10	2.05	2.00	2.00	2.00	1.95	1.95	2.00	1.90	1.90

Angle Bars, Chicago, 1914-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931.....	2.75c	2.75c	2.75c	2.75c	2.75c	2.75c	2.75c	2.75c	2.75c	2.75c	2.75c	2.75c
1930.....	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1929.....	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1928.....	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1927.....	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1926.....	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1925.....	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1924.....	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1923.....	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1922.....	2.45	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.50	2.75	2.75	2.75
1921.....	2.75	2.75	2.75	2.70	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.55
1920.....	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1919.....	3.00	3.00	3.00	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1918.....	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.15
1917.....	2.25	2.25	2.35	2.75	2.95	3.25	3.45	3.25	3.25	3.25	3.25	3.25
1916.....	1.50	1.50	1.50	1.50	1.90	2.00	2.00	2.00	2.00	2.15	2.25	2.25
1915.....	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
1914.....	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50

Tie Plates, Chicago, 1915-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931.....	1.95c	1.95c	1.95c	1.95c	1.95c	1.95c	1.95c	1.95c	1.95c	1.95c	1.95c	1.90c
1930.....	2.10	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.00	1.95
1929.....	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15
1928.....	2.25	2.25	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15
1927.....	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.25	2.25
1926.....	2.30	2.25	2.25	2.25	2.25	2.25	2.25	2.30	2.35	2.35	2.35	2.35
1925.....	2.35	2.45	2.45	2.40	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.35
1924.....	2.60	2.60	2.60	2.60	2.60	2.60	2.55	2.45	2.45	2.35	2.35	2.35
1923.....	2.40	2.45	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60
1922.....	1.90	1.85	1.75	1.80	1.85	1.85	1.85	2.00	2.20	2.35	2.35	2.35
1921.....	3.00	3.00	3.00	2.75	2.50	2.50	2.40	2.15	2.00	2.00	2.00	1.90
1920.....	2.75	2.75	2.75	2.75	2.75	2.75	2.80	3.00	3.00	3.00	3.00	3.00
1919.....	3.00	3.00	3.00	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1918.....	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
1917.....	2.75	2.75	2.90	3.00	3.00	3.00	3.40	3.50	3.50	3.50	3.50	3.45
1916.....	1.80	2.05	2.25	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.75
1915.....	.....	.....	.....	.....	.....	.....	.....	.....	1.50	1.50	1.70	1.80

Track Bolts, Chicago, 1914-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931.....	3.80c	3.80c	3.80c	3.80c	3.80c	3.80c	3.80c	3.80c	3.80c	3.80c	3.80c	3.70c
1930.....	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80
1929.....	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80
1928.....	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80
1927.....	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.80	3.80	3.80
1926.....	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90
1925.....	3.90	4.00	4.00	4.00	3.95	3.90	3.90	3.90	3.90	3.90	3.90	3.90
1924.....	4.10	4.10	4.10	4.10	4.10	4.10	3.90	3.80	3.80	3.80	3.80	3.80
1923.....	3.90	4.05	4.15	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25
1922.....	3.60	3.50	3.50	3.60	3.90	3.90	3.60	3.60	3.80	3.85	3.85	3.85
1921.....	5.00	5.00	5.00	4.85	4.75	4.45	4.40	4.15	3.65	3.65	3.65	3.60
1920.....	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.75	4.95	5.00	5.00	5.00
1919.....	4.90	4.90	4.90	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60
1918.....	4.90	4.85	5.05	5.10	5.10	5.10	5.10	5.10	5.10	5.10	5.10	5.10
1917.....	4.25	4.50	4.50	4.55	5.00	5.05	5.55	5.25	5.25	5.25	5.25	5.15
1916.....	2.60	2.65	3.20	3.25	3.25	3.25	3.25	3.25	3.25	3.60	4.20	4.25
1915.....	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.10	2.10	2.35	2.50
1914.....	2.05	2.00	2.00	2.00	2 00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

Market History—

Railroad Spikes, Pittsburgh, 1916-1931

	Jan	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931.....	2.80c	2.80c	2.80c	2.70c	2.70c	2.70c	2.70c	2.70c	2.70c	2.70c	2.70c	2.65c
1930.....	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
1929.....	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
1928.....	2.70	2.75	2.75	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
1927.....	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
1926.....	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.75	2.80	2.80	2.80	2.80
1925.....	2.90	2.90	2.85	2.80	2.80	2.80	2.80	2.75	2.75	2.80	2.80	2.80
1924.....	3.05	3.05	3.05	3.00	2.95	2.90	2.80	2.80	2.75	2.70	2.75	2.80
1923.....	2.85	2.90	3.15	3.15	3.15	3.15	3.15	3.15	3.15	3.15	3.15	3.05
1922.....	2.25	2.15	2.05	2.20	2.25	2.30	2.25	2.30	2.80	2.80	2.75	2.75
1921.....	3.65	3.65	3.30	3.30	3.25	3.25	3.00	2.75	2.45	2.35	2.30	2.25
1920.....	3.45	3.70	3.95	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	2.75
1919.....	3.65	3.65	3.55	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35
1918.....	4.00	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90
1917.....	3.40	3.40	3.50	3.65	3.90	4.20	4.70	6.20	6.50	6.15	5.00	4.75
1916.....	2.15	2.25	2.50	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	3.25

Structural Rivets, Pittsburgh, 1913-1931

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931.....	2.75c	2.75c	2.75c	2.75c	2.75c	2.75c	2.75c	2.75c	2.55c	2.30c	2.25c	2.25c
1930.....	3.10	3.10	3.10	3.10	3.00	2.90	2.90	2.75	2.75	2.75	2.75	2.75
1929.....	2.85	2.90	2.95	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10
1928.....	2.75	2.75	2.80	2.90	2.90	2.90	2.90	2.85	2.80	2.80	2.80	2.80
1927.....	2.35	2.30	2.30	2.75	2.75	2.75	2.75	2.85	2.85	2.75	2.75	2.75
1926.....	2.55	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
1925.....	2.60	2.55	2.50	2.50	2.45	2.40	2.45	2.40	2.40	2.40	2.60	2.60
1924.....	2.85	2.75	2.75	2.65	2.60	2.55	2.50	2.50	2.55	2.60	2.60	2.60
1923.....	3.00	3.00	3.25	3.25	3.25	3.25	3.15	3.00	3.00	3.00	2.75	2.90
1922.....	2.25	2.00	2.00	2.05	2.20	2.35	2.40	2.45	3.00	3.00	3.00	3.00
1921.....	4.15	3.90	3.70	3.60	3.30	3.00	2.70	2.35	2.30	2.40	2.30	2.30
1920.....	4.15	4.40	4.50	4.50	4.50	4.50	4.50	4.50	4.60	4.75	4.75	4.50
1919.....	4.40	4.20	4.20	3.70	3.70	3.70	3.70	3.90	3.90	3.90	4.00	4.05
1918.....	4.65	4.65	4.65	4.65	4.60	4.40	4.40	4.40	4.40	4.40	4.40	4.40
1917.....	4.25	4.25	4.50	4.75	5.05	5.25	5.25	5.25	5.25	5.25	5.00	4.65
1916.....	2.60	2.75	3.10	3.35	3.90	4.25	4.05	4.00	4.00	4.00	4.10	4.25
1915.....	1.45	1.45	1.45	1.45	1.45	1.50	1.50	1.50	1.60	1.75	2.30	2.45
1914.....	1.60	1.60	1.60	1.60	1.60	1.55	1.50	1.50	1.55	1.50	1.45	1.45
1913.....	2.20	2.20	2.20	2.20	2.15	2.15	2.10	2 00	2.00	1.90	1.80	1.75

Cast Iron Pipe, New York, 1915-1931

6-inch and Larger

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
1931.....	$38.10	$37.50	$37.50	$37.50	$35.75	$34.50	$33.70	$32.00	$28.50	$29.10	$29.00	$28.00
1930.....	36.90	38.50	38.50	38.50	38.50	38.50	38.50	38.50	38.50	38.50	38.50	38.50
1929.....	38.85	39.80	39.80	39.05	38.20	38.00	37.90	37.50	37.50	37.50	36.75	36.50
1928.....	37.15	36.75	36.75	37.25	37.65	38.25	38.08	37.60	37.60	37.10	37.20	38.60
1927.....	49.50	49.50	49.50	49.50	48.60	47.95	46.00	44.00	38.25	36.90	37.25	37.25
1926.....	51.50	51.50	51.50	52.75	51.50	51.50	51.50	51.50	51.50	51.50	51.50	51.50
1925.....	61.05	61.05	60.05	58.15	58.05	57.05	57.05	57.05	56.50	57.05	57.05	57.05
1924.....	66.10	66.10	66.10	66.10	66.10	65.10	65.10	64.10	64.10	64.10	62.10	60.60
1923.....	56.50	57.30	58.40	58.70	59.00	59.00	59.00	59.20	63.60	63.60	62.80	66.60
1922.....	47.30	47.30	47.60	48.80	48.80	49.80	53.30	54.50	55.30	55.30	55.30	55.30
1921.....	63.30	63.30	63.30	63.30	61.30	52.70	48.55	47.05	45.30	47.55	47.30	47.30
1920.....	67.30	70.30	71.30	73.30	76.30	76.30	76.30	76.30	77.20	77.20	77.20	77.20
1919.....	66.20	62.70	61.65	57.70	56.70	52.70	52.70	53.10	54.30	56.70	58.30	61.30
1918.....	55.35	55.35	55.35	55.35	56.55	61.35	62.30	62.50	62.70	67.50	67.70	67.70
1917.....	41.50	41.50	41.90	51.25	55.50	60.75	65.50	65.50	65.50	56.50	56.10	54.75
1916.....	29.00	29.40	29.50	30.50	30.50	30.50	30.50	30.50	30.50	30.50	34.50	41.00
1915.....	20.00	20.00	20.25	20.50	20.50	20.50	21.75	22.15	23.40	24.00	25.00	26.40

Cast Iron Pipe, Chicago, 1915-1931

6-inch and Larger

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931.....	$42.50	$42.50	$43.70	$42.10	$42.00	$42.00	$42.00	$39.00	$40.00	$40.00	$40.00	$40.00
1930.....	44.40	45.20	45.20	45.20	44.00	43.20	44.80	45.20	45.20	45.20	45.20	45.20
1929.....	45.20	45.20	45.20	45.20	45.20	45.20	45.20	45.20	45.20	45.20	45.20	45.20
1928.....	36.20	36.20	36.70	38.20	39.00	39.00	41.45	42.00	42.20	42.70	45.00	45.20
1927.....	45.70	43.70	44.00	44.20	43.20	42.80	42.20	38.95	36.20	34.30	35.30	35.30
1926.....	48.70	49.20	49.20	49.20	49.45	48.95	47.45	47.45	47.80	47.20	47.20	47.20
1925.....	49.00	50.20	48.20	46.10	46.95	47.95	48.20	49.20	49.45	49.20	50.20	50.20
1924.....	56.00	57.20	57.20	56.95	55.40	55.20	52.20	52.70	52.20	50.00	48.00	47.00
1923.....	51.20	53.20	53.70	55.20	57.20	57.20	59.20	60.45	59.20	57.95	56.85	59.20
1922.....	41.60	42.10	43.00	43.85	44.70	46.60	45.55	45.20	47.85	52.20	51.20	51.20
1921.....	64.10	64.10	64.10	64.10	64.10	51.50	47.60	44.35	42.90	42.60	42.60	42.60
1920.....	67.55	71.30	72.80	74.40	76.80	76.80	76.80	76.80	81.50	83.10	83.10	83.10
1919.....	64.30	61.80	60.55	56.80	54.80	51.80	52.60	54.80	55.80	59.80	59.80	63.80
1918.....	54.30	54.30	54.30	54.30	55.50	60.80	62.05	61.85	61.80	66.80	66.80	66.80
1917.....	41.00	41.50	43.70	52.50	55.50	60.75	65.50	65.50	65.50	57.75	52.10	53.50
1916.....	29.20	29.50	29.50	30.50	30.50	30.50	30.50	30.50	31.00	31.50	35.00	40.50
1915.....	23.40	23.00	23.00	23.00	23.00	23.00	24.00	24.00	24.70	25.75	26.90	27.90

Cast Iron Pipe, Birmingham, 1915-1931

6-inch and Larger

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1931.....	$37.00	$37.00	$36.50	$35.00	$35.00	$35.00	$35.00	$35.00	$33.00	$33.00	$33.00	$33.00
1930.....	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00
1929.....	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00
1928.....	29.00	29.00	28.50	30.00	33.50	31.00	32.50	34.00	34.00	35.00	36.40	37.00
1927.....	36.00	36.00	36.50	36.00	36.50	34.80	34.00	30.75	29.80	28.75	29.00	29.00
1926.....	42.00	41.25	40.24	40.00	50.00	40.00	40.00	40.00	39.40	40.00	39.00	38.00
1925.....	40.00	40.00	40.00	39.60	38.50	40.00	40.00	41.00	41.00	41.75	42.00	42.00
1924.....	46.80	47.50	48.00	48.00	48.00	48.00	47.00	47.00	45.00	44.40	46.00	40.00
1923.....	43.00	45.00	45.50	46.75	49.00	49.00	49.00	49.00	49.00	49.00	49.00	51.00
1922.....	35.00	34.00	33.00	34.15	34.70	37.00	37.00	37.30	40.00	43.00	43.00	43.00
1921.....	55.00	55.00	55.00	55.00	55.00	42.50	40.00	39.50	38.00	36.50	32.50	35.00
1920.....	60.00	64.50	66.00	67.00	70.00	70.00	70.00	70.00	72.40	74.00	74.00	74.00
1919.....	58.75	55.00	54.50	53.00	52.00	48.00	48.00	48.00	48.00	50.00	53.00	56.70
1918.....	49.00	49.00	49.00	49.00	50.20	55.00	55.00	55.00	55.00	60.00	60.00	60.05
1917.....	36.00	36.00	37.40	42.40	47.20	55.00	55.00	55.00	55.75	47.25	45.00	46.00
1916.....	24.00	24.50	25.00	25.00	25.00	25.00	25.00	25.50	25.50	25.50	28.40	35.00
1915.....	19.50	19.50	19.50	19.50	19.25	18.65	19.00	19.00	19.40	20.75	21.90	22.65

Aerial view of an Arbed works in Luxemburg. Arbed is the commonly used abbreviation of Acieries Reunies de Burbach-eich-Dudelange, one of the larger European iron and steel manufacturing companies

European Market Developments in 1931 Reviewed

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European Iron and Steel Domestic Prices in 1931

At Works or Furnace

British Prices in Pounds Sterling Per Gross Ton

	Jan. £ s d	Feb. £ s d	March £ s d	April £ s d	May £ s d	June £ s d	July £ s d	Aug. £ s d	Sept. £ s d	Oct. £ s d	Nov. £ s d	Dec. £ s d
Foundry No. 3 pig iron, Silicon 2.50-3.00.	2-18-6	2-18-6	2-18-6	2-18-6	2-18-6	2-18-6	2-18-6	2-18-6	2-18-6	2-18-6	2-18-6	2-18-6
Basic pig iron	3- 0-0	3- 0-0	3- 0-0	3- 0-0	3- 0-0	3- 0-0	3- 0-0	3- 0-0	3- 0-0	3- 0-0	2-16-0	2-16-0
Furnace coke	0-12-0	0-12-0	0-12-0	0-12-0	0-12-0	0-11-6	0-11-0	0-11-0	0-11-0	0-11-0	0-11-6	0-12-6
Billets	5-12-6	5-10-9	5- 8-9	5- 7-6	5- 7-6	5- 5-6	5- 5-0	5- 5-0	5- 1-0	5- 4-6	5- 7-0	5- 7-6
Standard rails	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0
Merchant bars	7-15-0	7-15-0	7-15-0	7-15-0	7-14-0	7-10-0	7-10-0	7-10-0	7- 0-0	7- 0-0	7- 0-0	7- 0-0
Shapes	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0
Plates, ship, bridge and tank*	9- 0-0	9- 0-0	9- 0-0	9- 0-0	9- 0-0	9- 0-0	9- 0-0	9- 0-0	9- 0-0	9- 0-0	9- 0-0	9- 0-0
Sheets, black, 24 gage	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0
Sheets, galvanized, 24 gage, corrugated	11- 3-0	11- 0-0	11- 0-0	11- 0-0	10-10-9	10- 1-5	9-13-0	9- 7-6	9- 4-0	9-14-6	9- 8-6	9- 5-0
Plain wire	9-10-0	9-10-0	9-10-0	9-10-0	9-10-0	9-10-0	9-10-0	9- 0-0	8-10-0	8-10-0	8-10-0	8-10-0
Bands and strips	9-10-0	9-10-0	9-10-0	9-10-0	9-10-0	9-10-0	9-10-0	9-10-0	9-10-0	9-10-0	9-10-0	9-10-0

*Delivered

German Prices in Reich Marks Per Metric Ton

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Foundry No. 3 pig iron, Silicon 2.50-3.00.	78	78	78	78	78	78	78	78	78	78	78	78
Basic pig iron	85.50	85.50	85.50	85.50	85.50	85.50	85.50	85.50	85.50	85.50	85.50	85.50
Furnace coke	21.40	21.40	21.40	21.40	21.40	21.40	21.40	21.40	21.40	21.40	21.40	21.40
Billets	110.50	110.50	110.50	110.50	110.50	110.50	110.50	110.50	110.50	110.50	110.50	110.50
Standard rails	127	127	127	127	127	127	127	127	127	127	127	127
Merchant bars	128	128	128	128	128	128	128	128	128	128	128	128
Shapes	125	125	125	125	125	125	125	125	125	125	125	125
Plates, ship, bridge and tank, 5 millim.	147	147	147	147	147	147	147	147	147	147	154.50	154.50
Sheets, black, 1 to 3 millimeters	160	160	160	160	160	160	160	160	160	160	160	160
Sheets, galvanized, 24 gage, corrugated	330	330	330	330	330	330	330	330	330	410	410	410
Plain wire	207	207	207	207	207	207	207	207	207	207	207	207
Bands and strips	148	148	148	148	148	148	148	148	148	148	148	148

French Prices in French Francs Per Metric Ton

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Foundry No. 3 pig iron, Silicon 2.50-3.00.	290	290	300	300	300	300	285	285	275	275	260	250
Semi-phosphorus pig iron	325	325	325	325	325	325	325	315	315	315	290	285
Furnace coke	158	158	158	145	145	145	145	145	145	145	145	145
Billets	490	490	490	490	490	490	490	490	490	420	400	390
Standard rails	785	785	785	785	785	785	785	785	785	785	785	785
Merchant bars	540	535	530	512	484	460	460	500	500	500	500	500
Shapes	620	550	550	550	550	550	550	550	550	550	550	550
Plates, bridge and tank, 5-millimeter	760	760	700	700	700	700	700	700	700	675	650	650
Sheets, black, 0.5-millimeter	1210	1210	1200	1195	1170	1160	1150	1140	1140	1080	1020	985
Sheets, galvanized, 0.6-millim., corrugated	1475	1475	1475	1425	1325	1325	1325	1325	1325	1325	1325	1325
Plain wire	1200	1200	1100	1100	1055	1025	1000	985	935	935	935	925
Bands and strips	690	690	685	680	630	610	590	600	610	625	625	575

Belgian Prices in Belgian Francs Per Metric Ton

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Foundry pig iron, Silicon 2.50-3.00	500	470	465	465	460	460	460	460	450	410	405	400
Basic bessemer pig iron	450	440	435	425	420	415	415	415	415	380	375	360
Furnace coke	180	180	185	185	185	185	185	185	185	160	160	160
Billets	680	670	655	660	660	645	632	600	560	530	510	505
Wire rod	897	897	873	850	850	850	850	850	850	850	850	850
Standard rails	1220	1210	1210	1210	1210	1210	1210	1210	1210	1210	1210	1210
Merchant bars	740	715	680	680	658	625	640	610	580	560	540	530
Shapes	718	705	675	670	656	620	625	605	575	545	535	530
Plates, bridge and tank, 5-millimeter	850	835	800	790	765	745	730	710	695	675	655	640
Sheets, black, 0.5-millimeter, annealed and straightened	1700	1700	1800	1800	1800	1750	1700	1675	1650	1625	1625	1600
Plain wire	1650	1650	1650	1600	1600	1600	1600	1600	1600	1500	1500	1500
Bands and strips	1075	975	975	1025	1075	1075	900	750	710	710	710	710

International Goodwill Is Necessary To Assure Strong Trade Revival

BY VINCENT DELPORT
European Manager, STEEL

DRAMATICALLY and without exception the reviews of the steel industry in the various countries of Europe which follow point to one conclusion: Acute depression in the form of restricted orders and falling prices, with a resultant curtailment of production.

Events in 1931 moved swiftly, from the time when financial difficulties in Austria came to a head until the departure of the pound sterling from gold standard. The ingenuity of man could not cope with the magnitude of the problems involved. By the time preventive measures could begin to take effect, the tide of destruction had moved on and further salient points had given way.

World prices dropped to a record low level, lower than that prevailing early in 1914. The prices at which export orders for merchant steel were taken left no margin of profit and in many cases every ton of steel sold resulted in a loss. Works were confronted with the alternatives of accepting unprofitable business, accumulating stocks, or closing down altogether.

Steel production reached its lowest point since 1922. The world statistics given on pages 148 and 149 show that thirteen years after the conclusion of the war, steel output has moved backward and lost in two years the advance which it took seven years to achieve.

Great Britain and Germany Hardest Hit

Among the leading nations of Europe, Germany and Great Britain were the most seriously affected. Germany's buying power was impaired through a succession of financial crashes and by inability on the part of the state and municipalities to repay short term loans and obtain fresh capital. A considerable decline in the activities of the home market resulted, which was only partly made up by export trade, and that at low profit. With all her splendid equipment and organizing ability, Germany can only hope to see the recovery of her steel industries when an international solution is found to the many involved problems now under consideration. This means that no serious revival can be looked for until well into 1932.

In Great Britain the worst of the crisis appears to have been overcome and the outlook at the beginning of the new year is more hopeful. One must go back several years to detect the particular causes of the British depression. Conditions deteriorated as time went by and reached a climax in September last year. In 1931, steel consumption decreased by about one million tons, imports continued to stream into the country to the detriment of national production, and actually exceeded exports, which dwindled to barely two million tons.

National Government Gives Confidence

With the advent of the national government, however, the steel industry regained confidence, mainly owing to the assurance that protection would soon be afforded by means of a tariff. In the meantime the depreciation of the pound sterling had already enabled British exporters to improve their position in foreign markets. An upward trend in British steel production can therefore be anticipated early in the year. The other nations of Europe were diversely affected by adverse conditions; in every case output was restricted, and the steelworks experienced a serious curtailment of profits, when they did not sustain heavy losses.

It is a notable fact that the European steel entente was unable to alleviate the difficulties with which the industry was faced. Throughout the year the influence of the entente was scarcely felt. Restriction of output was caused mainly by force of circumstances, and all efforts to stem the tide were unavailing.

However, the frame of the entente remains and it is hoped that around it a new and more effective structure may be built. It is even possible that once Britain regains command of her markets and feels sufficiently protected, she may join hands with the Continent with a view to allocating export markets and taking measures to maintain economic prices.

Although the new year has started on a path bristling with difficulties, there are distinct possibilities of improvement, provided that a spirit of conciliation and a constructive purpose prevail internationally. A revival of South American and Far Eastern markets also is a necessary condition.

European Iron and Steel Export Prices in 1931

F.o.b. Ports of Shipment

British Prices in Pounds Sterling Per Gross Ton

	Jan. £ s d	Feb. £ s d	March £ s d	April £ s d	May £ s d	June £ s d	July £ s d	Aug. £ s d	Sept. £ s d	Oct. £ s d	Nov. £ s d	Dec. £ s d
PIG IRON												
Foundry No. 3, Middlesbrough	2-18-6	2-18-6	2-18-6	2-18-6	2-18-6	2-18-6	2-18-6	2-18-6	2-18-6	2-18-6	2-18-6	2-18-6
Basic, Middlesbrough	3- 0-0	3- 0-0	3- 0-0	3- 0-0	3- 0-0	3- 0-0	3- 0-0	3- 0-0	3- 0-0	3- 0-0	2-16-0	2-16-0
Hematite, East Coast	3-10-0	3-10-0	3- 9-0	3- 7-0	3- 5-6	3- 3-6	3- 3-0	3- 2-0	3- 3-0	3- 5-0	3- 5-0	3- 5-0
SEMIFINISHED STEEL												
Billets	5-12-6	5-10-6	5- 8-9	5- 7-6	5- 7-5	5- 5-5	5- 5-0	5- 5-0	5- 1-3	5- 3-0	5- 7-0	5- 7-6
Wire rods	8-10-0	8-10-0	8-10-0	8-10-0	8-10-0	8-10-0	8-10-0	8-10-0	8-10-0	8-10-0	8-10-0	8-10-0
FINISHED STEEL												
Standard rails	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0
Merchant bars	7-15-0	7-15-0	7-15-0	7-15-0	7-13-0	7- 7-6	7- 0-0	7- 0-0	7- 0-0	7- 0-0	7- 0-0	7- 0-0
Structural shapes	7-15-0	7-15-0	7-15-0	7-15-0	7-15-0	7-15-0	7-15-0	7-15-0	7-15-0	7-15-0	7-15-0	7-15-0
Plates, ship, bridge and tank	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0
Sheets, black, 24 gage	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0
Sheets, galvanized, 24 gage, corrugated	11- 3-0	11- 0-0	11- 0-0	11- 0-0	10-16-0	10- 1-5	9-13-6	9- 6-6	9- 4-6	9-14-0	9- 8-6	9- 5-0
Bands and strips	9-10-0	9-10-0	9-10-0	9-10-0	9-10-0	9-10-0	9-10-0	9-10-0	9-10-0	9-10-0	9-10-0	9-10-0
Plain wire, base	9-10-0	9-10-0	9-10-0	9-10-0	9-10-0	9-10-0	9-10-0	9- 0-0	8-10-0	8-10-0	8-10-0	8-10-0
Galvanized wire, base	14- 0-0	14- 0-0	12-10-0	12-10-0	12-10-0	12-10-0	12-10-0	12-10-0	12-10-0	12-10-0	12-10-0	12-10-0
Wire nails, base	11- 0-0	11- 0-0	11- 0-0	11- 0-0	11- 0-0	11 -0-0	11- 0-0	11 -0-0	11- 0-0	11- 0-0	11- 0-0	11- 0-0
Tinplate, base box 108 pounds	0-15-9	0-15-6	0-15-6	0-15-6	0-15-3	0-14-3	0-14-0	0-13-6	0-14-0	0-14-9	0-14-6	0-14-3
Ferromanganese*	19- 6-0	16- 9-0	16- 9-0	16- 9-0	16- 9-0	17- 4-6	17- 9-6	17- 9-6	17- 9-6	$83	$83	$83

*Delivered Atlantic Seaboard, duty-paid

German Prices in Gold Pounds Per Metric Ton

F.o.b. Rotterdam or Northern Sea Ports

	Jan. £ s d	Feb. £ s d	March £ s d	April £ s d	May £ s d	June £ s d	July £ s d	Aug. £ s d	Sept. £ s d	Oct. £ s d	Nov. £ s d	Dec. £ s d
PIG IRON												
Foundry, No. 3, Silicon 2.50-3.00	2-10-0	2-10-0	2-10-0	2-10-0	2-10-0	2-10-0	2- 8-9	2- 8-9	2- 8-9	2- 8-9	2- 8-9	2- 8-9
SEMIFINISHED STEEL												
Billets	3-12-0	3-12-0	3- 6-0	3- 7-0	3- 5-3	3- 5-0	3- 5-0	3- 2-6	3- 0-0	2-17-0	2-16-0	2-13-0
Wire rods	5-15-0	5-10-0	5- 5-0	5- 5-0	5- 5-0	5- 5-0	5- 5-0	5- 5-0	5- 2-6	5- 2-6	5- 2-6	5- 2-6
FINISHED STEEL												
Standard rails	6-10-0	6-10-0	6-10-0	6-10-0	6-10-0	6-10-0	6-10-0	6-10-0	6-10-0	5-17-6	5-17-6	5-17-6
Merchant bars	4- 3-6	3-18-6	3-16-6	3-17-6	3-16-4	3-10-9	3-10-0	3-10-0	3- 3-6	3- 2-0	3- 2-0	2-18-0
Structural shapes	3-15-0	3-11-6	3-10-0	3-10-6	3- 8-6	3- 6-6	3- 6-0	3- 6-0	3- 1-6	3- 1-0	3- 0-0	2-17-0
Plates, ship, bridge and tank	4-16-9	4-15-0	4-10-0	4-11-0	4-10-3	4- 2-6	4- 2-0	4- 1-0	3-17-0	3-12-0	3-12-0	3-11-0
Sheets, black, 24 gage	8- 2-6	8- 2-6	8- 2-6	8- 2-6	8- 0-0	8- 0-0	8- 0-0	7-15-0	7-15-0	7-12-0	7-12-0	7-10-0
Sheets, galvanized, 24 gage, corrugated	10-10-0	10-10-0	10-10-0	10-10-0	10-10-0	10-10-0	10-10-0	10- 5-0	10- 0-0	10- 0-0	10- 0-0	10- 0-0
Bands and strips	4-12-0	4-12-0	4-10-0	4- 9-0	4- 7-6	4- 5-0	4- 5-0	4- 2-0	4- 1-0	4- 1-0	4- 0-0	3-17-6
Plain wire, base	5- 7-6	5- 7-6	5- 2-6	5- 0-0	5- 0-0	5- 0-0	5- 1-0	5- 1-3	5- 1-3	5- 7-0	5- 7-0	5- 7-0
Galvanized wire, base	6-15-0	6-12-0	6-10-0	6- 7-6	6- 5-0	6- 5-0	6- 5-0	6- 5-0	6- 5-0	6-10-0	6-10-0	6-10-0
Wire nails, base	5-10-0	5-10-0	5- 7-6	5- 3-9	5- 0-0	5- 0-0	5- 1-6	5- 2-6	5- 2-6	5- 7-0	5- 7-0	5- 7-0
Ferromanganese, f.o.b. port of shipment	14- 0-0	12- 5-0	9- 0-0	9- 0-0	9- 0-0	9- 0-0	9- 0-0	9- 0-0	9- 0-0	9- 0-0	9- 0-0	9- 0-0

French Prices in Gold Pounds Sterling Per Metric Ton

F.o.b. Channel Ports or Antwerp

	Jan. £ s d	Feb. £ s d	March £ s d	April £ s d	May £ s d	June £ s d	July £ s d	Aug. £ s d	Sept. £ s d	Oct. £ s d	Nov. £ s d	Dec. £ s d
PIG IRON												
Foundry, No. 3, Silicon 2.50-3.00	2-12-0	2-10-0	2- 9-0	2- 9-6	2- 9-0	2- 7-6	2- 8-0	2- 7-6	2- 7-6	2- 6-6	2- 5-0	2- 4-0
Basic bessemer	2- 8-0	2- 8-0	2- 7-6	2- 7-6	2- 7-6	2- 6-0	2- 6-0	2- 6-0	2- 5-6	2- 3-0	2- 2-0	2- 1-0
SEMIFINISHED STEEL												
Billets	3- 8-6	3- 8-6	3- 6-6	3- 6-0	3- 4-0	3- 2-6	3- 3-0	3- 1-6	2-17-0	2-16-6	2-15-0	2-13-0
Wire rods	5-15-0	5-10-0	5- 5-0	5- 5-0	5- 5-0	5- 5-0	5- 5-0	5- 5-0	5- 2-6	5- 2-6	5- 2-6	5- 2-6
FINISHED STEEL												
Standard rails	6-10-0	6-10-0	6-10-0	6-10-0	6-10-0	6-10-0	6-10-0	6-10-0	6-10-0	5-17-6	5-17-6	5-17-6
Merchant bars	4- 3-0	3-18-9	3-16-6	3-15-6	3-12-0	3-10-6	3-10-0	3- 7-0	3- 3-6	3- 2-6	3- 1-0	2-17-6
Structural shapes	3-13-0	3-10-9	3- 8-6	3- 8-0	3- 7-0	3- 5-9	3- 6-0	3- 4-6	3- 1-6	3- 1-0	2-19-0	2-16-6
Plates, bridge and tank, 5 millimeters	4-14-6	4-11-0	4- 7-9	4- 6-0	4- 4-6	4- 1-0	4- 1-0	3-18-6	3-15-6	3-13-0	3-11-6	3-10-6
Sheets, black, 0.5-millimeter	8-11-3	8- 7-6	8- 4-6	8- 3-6	8- 1-3	8- 0-0	7-18-6	7-18-0	7-18-0	7-15-0	7-12-6	7-10-0
Sheets, galvanized, 24 gage, corrugated	10-13-9	10- 6-3	10- 2-6	10- 2-6	10- 7-6	10- 0-0	10- 0-0	9-10-0	8-18-9	8-10-0	8- 2-6	8- 2-6
Bands and strips	4-12-6	4-10-6	4- 8-0	4- 7-6	4- 7-0	4- 3-0	4- 3-6	4- 3-6	4- 1-3	4- 0-0	3-17-6	3-16-0
Plain wire, base	5- 7-6	5- 2-6	5- 1-0	4-19-6	4-18-6	4-19-3	5- 0-6	5- 1-3	5- 1-3	5- 1-3	5- 5-0	5- 5-0
Galvanized wire, base	6-15-0	6-15-0	6-12-6	6-11-3	6- 9-0	6- 4-3	6- 3-0	6- 3-9	6- 3-9	6- 3-9	6- 3-9	6- 3-9
Wire nails, base	5- 8-0	5- 5-0	5- 3-6	5- 1-9	5- 0-0	5- 0-0	5- 1-0	5- 2-6	5- 2-6	5- 2-6	5- 6-3	5- 6-3

Belgian Prices in Gold Pounds Sterling Per Metric Ton

F.o.b. Antwerp

	Jan. £ s d	Feb. £ s d	March £ s d	April £ s d	May £ s d	June £ s d	July £ s d	Aug. £ s d	Sept. £ s d	Oct. £ s d	Nov. £ s d	Dec. £ s d
PIG IRON												
Foundry, No. 3, Silicon 2.50-3.00	2-12-0	2-10-0	2- 9-0	2- 9-6	2- 9-0	2- 7-6	2- 8-0	2- 7-6	2- 7-6	2- 6-6	2- 5-0	2- 4-0
Basic bessemer	2- 8-0	2- 8-0	2- 7-6	2- 7-6	2- 7-6	2- 6-0	2- 6-0	2- 6-0	2- 5-6	2- 3-0	2- 2-0	2- 1-0
SEMIFINISHED STEEL												
Billets	3-10-6	3- 8-0	3- 5-0	3- 5-0	3- 4-0	3- 2-6	3- 3-0	3- 1-6	2-17-0	2-16-6	2-15-0	2-13-0
Wire rod	5-15-0	5-10-0	5- 5-0	5- 5-0	5- 5-0	5- 5-0	5- 5-0	5- 5-0	5- 2-6	5- 2-6	5- 2-6	5- 2-6
FINISHED STEEL												
Standard rails	6-10-0	6-10-0	6-10-0	6-10-0	6-10-0	6-10-0	6-10-0	6-10-0	6-10-0	5-17-6	5-17-6	5-17-6
Merchant bars	4- 3-0	3-18-9	3-16-6	3-17-0	3-12-0	3-10-6	3-10-0	3- 6-0	3- 3-6	3- 2-6	3- 1-0	2-17-6
Structural shapes	3-13-0	3-10-9	3- 8-6	3- 9-0	3- 7-0	3- 5-9	3- 6-0	3- 4-6	3- 1-6	3- 1-0	2-19-0	2-16-6
Plates, bridge and tank, 5 millimeters	4-14-6	4-11-0	4- 7-9	4- 6-6	4- 4-6	4- 1-0	4- 1-0	3-18-6	3-15-6	3-13-0	3-11-6	3-10-6
Sheets, black, 0.5-millimeter	8-11-3	8- 7-6	8- 5-0	8- 3-9	8- 1-3	8- 0-0	7-18-6	7-18-0	7-18-0	7-15-0	7-12-6	7-10-0
Sheets, galvanized, 24 gage, corrugated	10-13-9	10- 6-3	10- 2-6	10- 2-6	10- 7-6	10- 0-0	10- 0-0	9-10-0	8-18-9	8-10-0	8- 2-6	8- 2-6
Bands and strips	4-12-6	4-10-6	4- 8-0	4- 7-6	4- 7-0	4- 3-0	4- 3-6	4- 3-6	4- 1-3	4- 0-0	3-17-6	3-16-0
Plain wire, base	5- 7-6	5- 2-6	5- 1-0	4-19-6	4-18-6	4-19-3	5- 0-6	5- 1-3	5- 1-3	5- 1-3	5- 5-0	5- 5-0
Galvanized wire, base	6-15-0	6-15-0	6-12-6	6-11-3	6- 9-0	6- 4-3	6- 3-0	6- 3-9	6- 3-9	6- 3-9	6- 3-9	6- 3-9
Wire nails, base	5- 8-0	5- 5-0	5- 3-6	5- 1-9	5- 0-0	5- 0-0	5- 1-0	5- 2-6	5- 2-6	5- 2-6	5- 6-3	5- 6-3

Britain Prepares To Protect Her Industry by Tariff Wall

BY J. A. HORTON
British Correspondent, STEEL

THE record of 1931 must necessarily be written so as to lay emphasis on the last few months of the year, seeing that Britain went off the gold standard in September. Since then, events have followed quickly upon each other. A strong national government was returned in October, and less than a month afterwards came the anti-dumping bill.

At the beginning of the year the British steel industry was in an unhealthy condition. With a hesitating demand and shaky prices, the tone was anything but confident, though some bold prophets pointed to the old phrase: "The darkest hour is before the dawn." There was, in fact, no major movement in the trade in the first six months.

Heavy Steel Prices Hold

In order to stimulate business in the domestic market and discourage the buying of foreign material, the Steel association, at a meeting in January, increased the rebates on plates, beams and sections, thus increasing the preference to buyers who pledged themselves not to touch imported steel. Curiously enough, there has been no adjustment of heavy steel prices since that date, despite pressure from shipbuilders and other users of heavy material who considered they had a good claim for special treatment at the hands of British steelmakers.

In those branches of the trade, however, where buying and selling took place in a free market (as distinct from that controlled by an association), the pressure of competition and anxiety to keep mills at work brought down prices considerably. Soft billets in January cost £5 12s 6d upward per ton; by August they were down to £5 5s, and not until October was there any indication of a rally. Then the position was influenced by the prospect of a tariff on foreign steel to the extent that British makers decided to tighten up quotations, an effort crowned with considerable success.

Pig iron producers displayed remarkable coolness in the crisis with which they were faced during the year. Makers in the Middlesbrough district never once swerved from the price of £2 18s 6d fixed for No. 3 foundry, 2.5 to 3 per cent silicon. In the Midlands it was not possible to maintain the position so firmly, but after a drop of 5s in May it was abundantly clear that furnacemen were determined not to show a weak front to the demands for cheaper pig iron, and, in fact, no change was made thereafter.

Broadly speaking, the passing of the gold standard, the depreciation of sterling, and the return of a strong national government to power likely to introduce measures designed to assist the industry, all helped to foster a feeling of confidence in eventual rehabilitation and restoration.

Raw Materials Lead Gain

The gain in actual business was most marked in the raw material industry. Everywhere pig iron producers added to their order books contracts covering thousands of tons for delivery to the end of the year. If they had been so disposed they could have taken business over a longer period, but a tempering spirit of caution influenced them in refusing to become involved in business which contained a certain element of risk in view of a possible upward turn in values. The buying movement was partly accounted for by the fact that stocks at consumers' works had been allowed to become depleted, almost to vanishing point, during the slump.

Shortly after the first burst of excitement had subsided there was naturally some reaction and traders paused to take stock of the position. As already indicated, the improvement in business was more marked in pig iron than in steel. Steelworks had become accustomed to working spasmodically, owing to the very poor specifications available from the heavy industries such as shipbuilding, structural engineering and railroad work. An alteration in this state of affairs obviously could not be expected in a week nor a month. There were signs at the beginning of November that these branches were showing a little more life and showing promise for the future.

October Saw Tide Turn

The turn of the tide as regards output came in October. In January, 1931, production of pig iron totaled 337,200 tons, and steel ingots and castings amounted to 402,200 tons. With a few minor fluctuations, output fell slowly until in September pig iron totaled only 248,200 tons, and only 62 furnaces were in blast. With the altered financial conditions in October, four furnaces were relighted, and there was an increase of some 34,000 tons in production.

The lowest point touched by steel during the year was in August, when only 357,300 tons were made. A week's shutdown for holidays accounted for a considerable proportion of the drop. September found an improvement with 400,500 tons, and by the end of October the total was 457,400 tons, the nearest point toward March, the peak month, when 500,100 tons of steel were produced.

Overseas business throughout the year was unsatisfactory from the point of view of the British exporter. For many months imports exceeded exports on a tonnage basis. In the first ten months of 1931 exports totaled 1,609,658 tons, while imports amounted to 2,205,694 tons. Even with a world-wide slump prevailing, 93,815 tons of forge and foundry pig iron

British Business Progress in 1931

(Gross tons 000 omitted)

	PRODUCTION				IMPORTS			EXPORTS		
Monthly ave.	Coal	Pig iron and ferro-alloys	No. furnaces in blast	Steel ingots and castings	Iron ore	Pig iron and ferro-alloys	Steel†	Furnace Coke	Pig iron and ferro-alloys	Steel†
1913	23,951	855	338	639	603	18.0	168	...	93.7	320
1928	19,814	551	132	710	370	9.9	231	133	37.9	317
1929	21,393	632	162	803	574	12.8	222	138	45.5	319
1930	20,313	516	76	608	345	26.0	216	129	26.4	237
1931										
Jan.	19,174	337	83	402	207	23.3	198	154	18.8	149
Feb.	18,920	318	81	486	180	20.8	156	108	13.8	130
March	19,391	357	81	500	211	22.8	188	96	15.8	154
April	18,574	323	78	397	184	26.1	167	106	13.7	174
May	17,287	347	80	435	191	27.6	200	48	22.0	146
June	17,831	324	76	429	202	29.6	217	71	27.3	135
July	17,083	317	70	429	176	21.0	210	97	19.4	149
Aug.	16,110	276	64	357	155	25.2	177	137	12.2	132
Sept.	17,959	248	62	400	109	15.9	204	124	12.8	126
Oct.	19,670	284	66	457	135	30.6	245	185	14.3	145
Mo. ave.	18,200	313	66	429	175	24.3	196	112	17.0	144

*Average for 1913; on last day of year or month for subsequent figures; †Includes iron castings, but scrap excluded.

were imported in the same period, compared with 47,117 tons in 12 months in the prosperous times of 1913.

It is significant that the record of October, following the changed position of the pound, gave an increase in tonnage of nearly 20 per cent in the imports of crude iron and steel, but a decrease in the imports of rolling mills products and of finished goods, the decrease being substantial in respect of rolling mill products.

Improvement Starts In October

In October Britain exported 158,812 tons of steel and iron, valued at £2,363,954. This was an improvement on the two months immediately preceding, the galvanized sheet and tin plate trades showing some recovery from the low level to which they had sunk. Another branch which made a better return was that concerned with hoops and skelp; the tonnage was more than doubled. In the ten months the total value of iron and steel exports was £25,027,499, against £44,858,297 in the corresponding period of 1930.

Foreign shippers were particularly active toward the end of the year, having been quick to realize that the day was fast passing in which goods of every description could be dumped in British ports without let or hindrance. In South Wales there was a considerable increase in the landings of continental bars and billets, which could only be attributed to a desire to forestall duties.

With regard to the prospects for the future, it is most unlikely that the very substantial steel import business will come to a sudden end. Such a thing would be well nigh impossible, owing to the problems involved. Nevertheless, matters came to such a pitch that in November the body of opinion in favor of some sort of protection, whether in the form of a tariff or dumping duty is not of much consequence, was stronger than ever.

Indeed, the cry went up that unless something was done quickly the British steel trade was in danger of extinction. A striking instance of the helplessness of the position is to be found in the fact that the firm of Dorman, Long & Co. Ltd., Middlesbrough, famed the world over for its structural engineering enterprise, particularly on the Sydney bridge, has not paid any dividend on its preferred ordinary shares over a period of seven years. Unfortunately, that is only one of the many British firms in the steel industry which have been unable to earn profits.

Concurrently with the reduction of activities in the iron and steel industry, imports of foreign iron ores into Great Britain dropped from 3,674,826 gross tons in the first ten months of 1930 to 1,749,813 tons in the same period of 1931. Imports of scrap decreased proportionately. The coal industry, which was already hit by the curtailing of export trade, was further depressed by the reduced demand from the metallurgical works.

Expect Aid From Tariff

A reasonable prospect of improvement in 1932 seems assured. The general impression is that the exchange position will be against the pound sterling for some time, thus acting as a deterrent against imports and reducing export prices, and that the home manufacturers' position will be further strengthened by a tariff. Such a tariff will probably apply to all categories of iron and steel commodities from pig iron to the finished product, and including semifinished steel, following an ascending scale.

It is not desired that the tariff should be prohibitive; it would be comparatively low for pig iron, and rise gradually to the more finished product. It is expected, however, that a clause may be inserted in the act, providing for extra duty in the case of dumping or abnormal imports. The objections on the part of consumers are showing signs of subsiding, and a national outlook seems to take the place of the more sectional feeling that prevailed previously.

Prices May Be Lowered

It is predicted in some quarters that with the relighting of more pig iron furnaces and a duty on imported pig iron, British producers will be able to lower their price by a substantial amount. Sir William Larke, director of the National Federation of Iron and Steel Manufacturers, stated recently his satisfaction that the government had taken powers to insure that their mandate to restore prosperity to industry was not made impossible of fulfillment in the near future by an influx of imports during the time they naturally required for devising their permanent fiscal policy, and at the steps they were taking to secure that the adverse balance of trade was not increased.

Iron and steel manufacturers in Britain were, therefore, confident that whenever the necessity arose, these powers would be exercised in such a manner as would secure the best interests of the industry and of the nation by increasing the employment capacity of iron and steel.

The volume of orders in the various iron and steel centers is definitely on the increase, and inquiries have been more numerous. Increased interest in shipbuilding is expected in the spring, judging by the present outlook. Some improvement in the demand for galvanized sheets has been experienced among makers in South Wales, Scotland and the Midlands, but it has not been possible to maintain the better standard of prices achieved in October.

Tin Plate Trade Gains

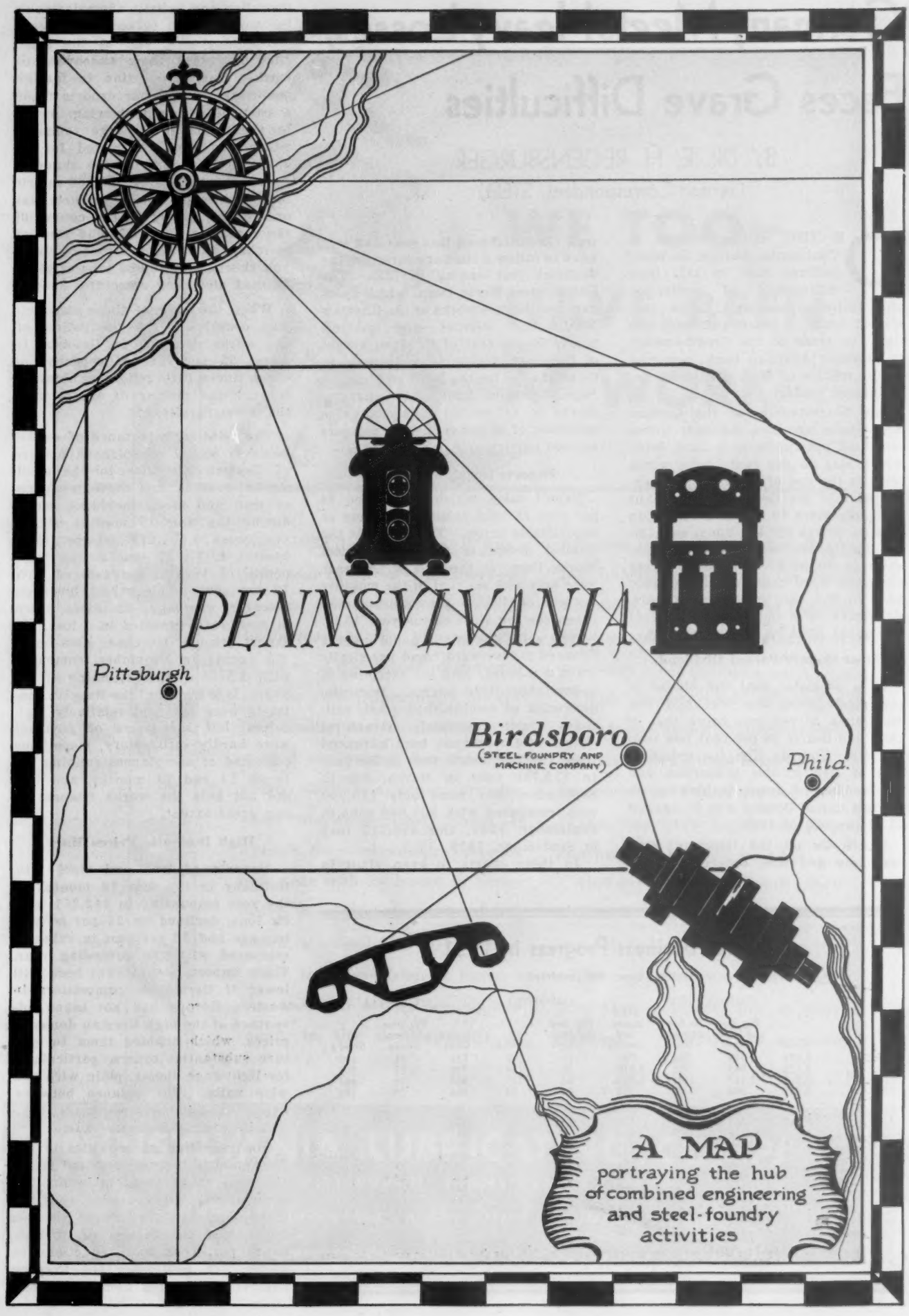
Output is on the increase in the Welsh tin plate trade, and the depressed condition of sterling enabled exporters to re-enter markets which had long been closed to them. The precarious position of the nonferrous metal markets, however, has been a source of great anxiety among users of tin and spelter. It seems fairly certain to assume that in Britain industry generally the prospects of recovery are good, but the year 1932 must be a period of rebuilding and readjustment, especially for the iron and steel trades. Much ground needs to be made up, and success can only be achieved by patient plodding.

Solution of world problems is on the way and will add to stability of business in all countries. Interrelations have become so close that British trade is bound up with the Continent and the United States, factors affecting one being felt strongly by each of the others.

British Iron and Steel Exports

(Gross tons)

Principal Commodities	(First nine months) 1931	1930	1929
Pig iron	145,328	214,923	352,961
Ferro-alloys	10,530	36,693	70,328
Ingots	782	761	1,323
Semifinished steel	4,921	10,854	12,752
Bars, shapes and wire rod	96,878	187,835	259,366
Special and tool steel	1,912	2,372	2,842
Bands, hoops and cold-rolled strip	20,064	32,702	44,553
Plates and sheets, black and galvanized	347,711	623,441	943,833
Tin, terne and coppered plates	283,647	399,294	427,940
Wire products	42,815	69,967	97,132
Wire nails, screws, nuts and bolts	18,867	34,077	38,545
Rails and track material	124,203	276,655	284,230
Tires, wheels, axles and other material	28,698	61,068	73,575
Structural steelwork	20,635	44,661	61,482
Cast iron pipes and fittings	54,338	90,045	99,401
Other iron castings	13,941	18,440	19,745
Cables, chains and anchors	5,866	10,236	12,896
Forged tubes, bedsteads, hollow-ware	109,724	189,091	249,383
Hardware	82,599	106,708	129,542
Miscellaneous	119,986	216,977	221,998
Total	1,533,445	2,626,800	3,403,827
Scrap	131,363	126,302	346,447
TOTAL, including scrap	1,664,808	2,753,102	3,750,274


PENNSYLVANIA
Pittsburgh
Birdsboro
(STEEL FOUNDRY AND MACHINE COMPANY)
Phila.
A MAP
portraying the hub of combined engineering and steel-foundry activities

Germany Meets Heavy Losses; Faces Grave Difficulties

BY DR. E. H. REGENSBURGER
German Correspondent, STEEL

OF THE leading nations in Continental Europe, Germany suffered most in 1931 from curtailment of production and business depression. The year started under a cloud and from the time the crash of the Credit-Anstalt, the leading Austrian bank, occurred in the middle of May, conditions deteriorated rapidly.

One characteristic of the German steel trade was that domestic prices remained practically at a fixed level, which was 35 per cent above world level at the end of the year. It is expected that the German government will take steps to insure a reduction of steel prices for the home consumer. Partly due to these high prices, sales to domestic consumers during the year were considerably reduced and, in the case of merchant bars, deliveries were only 36 per cent of the quota fixed by the association.

Most Makers Passed Dividends

It is estimated that the output of raw steel during the year 1931 was more than 26 per cent below that of 1930, and nearly 48 per cent less than in 1929. For pig iron the reduction was of still greater proportion and the number of furnaces blowing on the last day of October was 47, against 63 at the end of 1930.

Practically all the important German iron and steel concerns had to pass their dividend last year and will have to follow a similar course for the financial year ending in 1932. The United Steel Works Corp., which amalgamates the steelworks of the Rhenish-Westphalian district and controls nearly 50 per cent of the steel output of Germany, registered a decrease in its total sales for the fiscal year ending Sept. 30 from 1,261,000,000 Reichsmarks to 843,000,000 Reichsmarks, a reduction of 33 per cent. This decrease applied particularly to domestic sales.

Exports Brought No Profit

Export sales, which constituted 44 per cent of total sales, were made at unprofitable prices. The fact that the unfilled orders of the United Steel Works Corp. at the end of the year were only 40.8 per cent of the monthly average of 1929-30 constitutes a bad omen for the start of the year 1932.

The activities of the home market followed a downward trend practically without a break, with the exception of a few short-lived spurts. Domestic deliveries of semifinished steel, railroad track material, structural shapes and merchant bars advanced from 190,700 metric tons in January to 199,700 tons in March, but in September they were only 115,900 tons, compared with 225,000 tons in September, 1930, and 438,715 tons in September, 1929.

In their efforts to keep plant in operation and to limit unemployment, the works began to accumulate considerable stocks, and at the same time increased their endeavors to market their production to foreign countries. September exports made a particularly good showing, owing to the shipment of large tonnages which had been contracted for by Soviet Russia early in the summer. An aggregate of over 300,000 metric tons of iron and steel products was ordered by Russia in the course of the year, including 120,000 tons of merchant bars, 120,000 tons of plates and sheets, and 60,000 tons of semi-finished steel and structural shapes.

When the bulk of these contracts was completed, the occupation of the works declined, in October, to about 35 per cent of capacity, at which time a little relief was obtained through the placing of orders from the German railroads.

The relative importance of export business was a conspicuous feature of German activities in the steel market in 1931, and German exports of iron and steel, including scrap, during the first 10 months of the year were 3,609,117 metric tons, against 4,097,522 tons in the same period of 1930, a decrease of only 12 per cent. This export business, however, was taken at prices which in most cases resulted in a loss, the export price of merchant bars being £3 (gold) in November, compared with £5 5s at the beginning of the year. It is true that the Russian contracts were taken at relatively high prices, but the terms of payment were hardly satisfactory, since they consisted of acceptances running between 14 and 24 months, and this did not help the works finances to any great extent.

High Domestic Prices Hurt

Imports of iron and steel into Germany in the first 10 months of the year amounting to 842,251 metric tons, declined by 26 per cent in tonnage and 33 per cent in value as compared with the preceding year. These imports would have been still lower if Germany's competitors in western Europe had not taken advantage of the high German domestic prices, which enabled them to capture substantial orders, particularly for light-gage sheets, plain wire and wire nails. The balance between exports and imports continues to be well in favor of German trade.

The reduction of activities in the German steel industry resulted in the dismissal of a considerable number of workers, but in order to limit these dismissals there were also reductions in the number of working hours per week and reductions in wages. In September the average number of working hours per week

German Business Progress in 1931

(Metric tons 000 omitted)

	PRODUCTION*				IMPORTS‡		EXPORTS‡		
Mo. ave.	Coke	Pig iron and ferro-alloys	No. fur-† naces in blast	Steel ingots and castings	Pig iron and ferro-alloys	Steel g	Coke	Pig iron and ferro-alloys	Steel g
1913	2,639	910	204	993	11	41	534	71	470
1928	2,822	985	101	1,210	26	174	740	25	395
1929	3,213	1,117	95	1,354	15	137	888	36	448
1930	2,705	808	63	962	14	94	664	19	381
1931									
Jan.	2,240	603	61	773	10	68	590	10	363
Feb.	2,012	520	53	760	9	80	557	8	318
March	2,120	560	56	811	9	84	561	8	361
April	1,850	529	58	743	10	90	438	8	336
May	1,867	555	59	744	12	83	365	21	346
June	1,883	575	61	779	13	79	442	47	323
July	1,954	569	59	803	11	73	548	23	290
Aug.	1,861	499	56	689	11	64	588	12	307
Sept.	1,777	438	49	593	10	55	653	15	386
Oct.	1,790	434	47	603	10	47	627	12	401
Mo. avg.	1,935	528	47	730	10.5	72	537	16	343

*Figures for 1913 are for Germany in her present boundaries; †On last day of year or month; ‡Figures for 1913 for pre-war boundaries, and include Luxemburg; g Includes iron castings and scrap.

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1885—*Lubrication in the Steel Industry*—1932

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in the Rhenish-Westphalian district was 41, and the average wage per worker per month was 157 Reichsmarks. Further wage reductions are being negotiated.

The pig iron market was particularly dull throughout the year, and only 3 per cent of the output was exported, making a total of 156,985 metric tons for the first 10 months. Fifty per cent of these shipments went to Russia. Imports of pig iron into Germany in the corresponding period were only 102,510 metric tons. Domestic prices were reduced by about 3 per cent at the beginning of the year, and then remained fixed at 78 Reichsmarks per ton for foundry pig iron, containing 2.5 to 3 per cent silicon.

Scrap and Ore a Burden

The scrap market was unsatisfactory, and scrap quotations dropped by about 50 per cent during the year. A serious situation continues to prevail with respect to iron ore on account of the important contracts previously made with Swedish firms, which contracts run to the year 1942. The Swedish mines, however, have agreed to the postponing of deliveries and to cancellation of deliveries not made in 1931, with the result that German imports of iron ore declined from 12,241,705 metric tons in the first ten months of 1930 to 6,340,723 tons in the corresponding period of last year.

Already at the end of 1930 the value of German stocks of iron ore was estimated at 80,000,000 Reichsmarks.

The outlook for the year 1932 is most uncertain. The difficulties with which Germany is faced in her own market are added to by such disturbing influences as the fluctuations in the sterling rate and the almost certain imposition of a tariff against foreign goods in Great Britain.

Central Europe Has Share Of Industrial Depression

BY DR. ING. TILLE
Special Correspondent

AS FAR as the iron and steel industry is concerned, the general economic crisis in central and eastern Europe manifested itself in the course of 1931 in a further reduction of the output of pig iron and raw steel. The level of domestic prices did not, it is true, suffer a serious drop, but in spite of this, the tendency of the iron and steel markets was, on the whole, a falling one.

In Czecho-Slovakia, iron and steel prices had been reduced by an average of 7 per cent toward the end of 1930. This, however, did not bring about any revival of the market; on the contrary, sales decreased still further, and this resulted in a reduction of the output of pig iron and steel amounting to about 15 per cent and 12 per cent respectively in comparison with 1930. In every branch of the industry investments were restricted to the minimum, and the steel industry found itself with considerable lack of employment.

Czecho-Slovak Exports Important

The Czecho-Slovak steelworks syndicate was prolonged up to the end of 1940. Czecho-Slovakia still remains affiliated to the international cartels, such as the IRMA (International Rail Makers Association), the EJA (European Steel Entente), the IWV (International Wire Rod Syndicate) and the IWECO (International Wire Export Co.) and others.

The iron and steel exports of Czecho-Slovakia form about 50 per cent of the total output of that country, and a considerable portion of these exports, about 65 per cent, was exported to Russia. In the latter part of 1931 an act was passed granting state guarantees for export business.

Business relations with Russia, however, gradually declined, owing to the difficulty of financing these transactions on 18 months' credit and of getting the Russia bills discounted. The depreciation of the pound sterling also had a disturbing effect upon the continuity of deliveries to Russia, since a considerable part of the contracts had been booked for payment in pounds.

Credits Trouble Austria

In Austria the economic situation further deteriorated, due to the important bank failures which occurred in the early summer and to the uncertain political situation brought about by the disturbances on the part of the nationalist party, which aimed at the overthrow of the government. The decrease in output, if the figures so far known for 1931 are compared with those of 1930, amounts to 48 per cent for pig iron and 22 per cent for raw steel. In spite of this, prices remained practically unchanged.

In Hungary the output of raw steel in 1931 fell more than in any other of the central European states. The output in 1929 was 513,000 metric tons, whereas in 1930 it was only 370,000 tons, and it certainly will not attain a higher figure than 240,000 tons for 1931, that is to say, it will be nearly 40 per cent lower than the output of the preceding year.

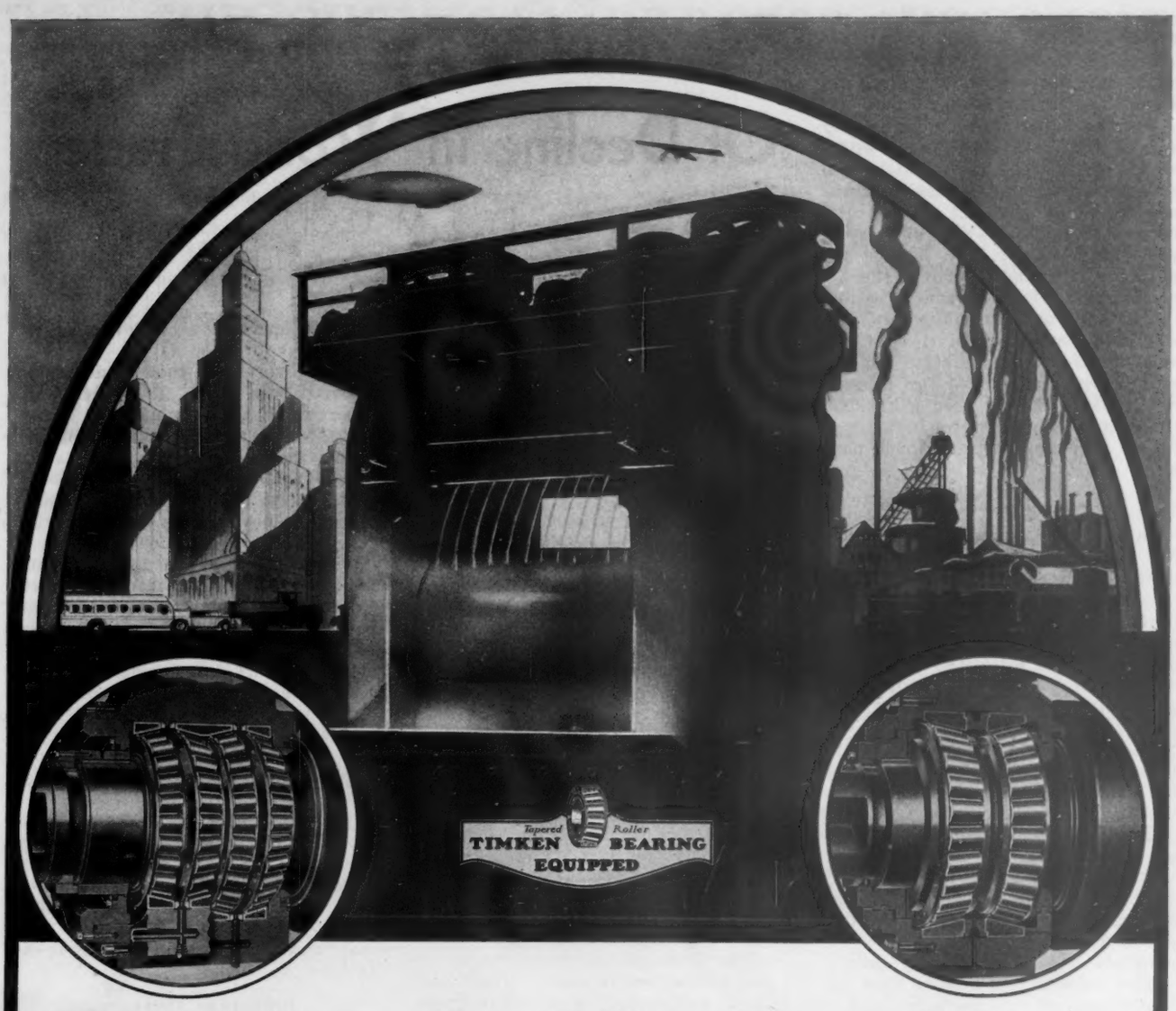
Both Austria and Hungary are members of the international iron and steel syndicates, while Poland still remains an outsider.

Although the fall in the output of the Polish works during the last two years was smaller than in any of the states mentioned above, the reduction of the pig iron output in 1931 being about 13 per cent, and that of raw steel 6 per cent, in comparison with 1930, the situation of the iron and steel industry in Poland is serious. The reason for this is the con-

German Iron and Steel Exports

(Metric tons)

Principal Commodities	(First nine months) 1931	1930	1929
Pig iron	145,304	164,843	290,446
Ferro-alloys	6,589	41,298	35,825
Ingots and semifinished steel	284,361	304,921	347,051
Bars and shapes	718,510	810,614	1,014,569
Hoops and bands	94,240	111,745	
Plates and sheets, black and galvanized	312,633	411,955	500,241
Tinplates	45,118	26,524	21,305
Wire rod and wire products	300,565	306,519	463,186
Wire nails, screws, nuts and bolts	66,779	73,506	85,920
Rails and track material	215,375	263,383	330,341
Tires, wheels and axles	29,025	47,637	48,371
Structural steelwork	46,709	101,799	67,776
Forgings and malleable castings	181,013	215,167	183,536
Cast iron pipe	64,899	80,373	88,298
Other iron castings, except malleable	122,822	135,623	135,593
Anchors, anvils, hammers, blocks, etc.	3,712	5,976	6,011
Forged tubes	162,702	212,362	281,943
Boilers, reservoirs, etc.	61,156	71,267	84,287
Hardware	23,756	31,922	32,808
TOTAL, including items not specified	2,999,648	3,539,537	4,191,520
Scrap and turnings	182,881	209,871	179,458
TOTAL, including scrap	3,182,529	3,749,408	4,370,978



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siderable decrease of sales in the Polish domestic market, which decrease the industry endeavored to counteract by exporting more than 66 per cent of the total output.

Of this exported tonnage, nearly 95 per cent went to Russia, which means that exports of Polish iron and steel products to Russia formed more than 60 per cent of the total output. As a large part of this export business had been booked for payment in pounds sterling, the depreciation of that currency caused the Polish works to suffer very considerable losses, and in view of this and the fact that the state guarantees previously granted for Russian credit have already been exhausted, the Polish iron and steel industry is in an exceedingly precarious position.

Russia and Balkans Dull

In Rumania the economic position has taken a turn for the worse, which manifests itself, as far as the iron and steel industry is concerned, in a decrease in the production of raw steel in 1931 of about 25 per cent compared with the production of the year 1930. The total output will in all probability not even reach 100,000 tons.

In Yugo-Slavia the exchange control act prevented depreciation of the currency, but the situation of the iron and steel industry is unsatisfactory, the production of raw steel being negligible.

Even in Russia the output of raw steel in 1931 fell by about 6 per cent in comparison with the previous year's figures, although hitherto the tendency had been a rising one.

The latest reports state that the completion of the five-year plan is encountering considerable difficulties of a technical nature, which apparently have not failed to leave their mark on the state of employment in the Russian steel industry.

France Now Feeling Effects Of Decline in World Trade

BY J. M. LEON
French Correspondent, STEEL

THE forebodings which manifested themselves at the end of 1930 concerning the position of the French steel industry materialized rapidly, owing to the depression which spread over all steel-consuming countries. The result was first felt by those works which were accustomed to enjoy a large measure of export trade. As export orders became severely restricted those works had to concentrate their efforts on the domestic market by offering large tonnages, which had a depressing effect on prices.

Government Aid Given

The average monthly output of steel ingots and castings in the first ten months of the year was 15.11 per cent less than in the corresponding period of 1930, and tended to decrease. The tonnage of steel declared by France to the European steel cartel for the first three-quarters of 1931 was 6,110,585 metric tons, an excess of 54,521 tons or 0.9 per cent over the tonnage allowed, France having the advantage of an active domestic market, thanks to the protectionist policy, which enabled agriculture and industry to preserve their buying power. Owing, however, to the substantial decrease in the volume of export orders for steel products, a number of works in France had to curtail their activities and operate only a few days per week or hours per day.

The government took measures to alleviate the crisis in France, and a part of the plan for national equipment, covering the improvement of roads, the electrification of villages, and extensions at certain harbors, will soon be put into effect. Furthermore, the government will authorize the railroad companies to issue a loan which will enable them to place a number of large contracts for track material and rolling stock which have been held back since the middle of 1931, when the railroad companies showed a very large deficit. Wages were reduced by an average of about 6 per cent. There were no serious strikes during the year, except in the northern districts, where stoppages occurred in the textile industries.

The French steel market is controlled to a considerable extent by a number of syndicates, which are themselves closely linked with the European steel entente. The influence of the entente during the year was, however, practically without effect on the market.

Entente in Abeyance

A scheme of reorganization had practically been arrived at, with a view of fixing for each member country a tonnage quota for export business, but when the final scheme was to be submitted for consideration, the German financial crisis occurred, with the result that the time was considered unfavorable for renewing the entente, the life of which was simply extended from month to month until Dec. 31, 1931, awaiting opportunity for revival.

In France, the national wire rod syndicate, like the international syndicate, was extended for a period of five years, and a number of new works joined the French syndicate, which now includes practically all the manufacturers of wire rod. Satisfaction is generally expressed at the manner in which this syndicate worked, and it is to be noted that the prices of this commodity were well maintained throughout the year. The French syndicate of wire product manufacturers which was set up in 1930 was also continued, and will eventually be linked up with an international syndicate, the French

French Business Progress in 1931

(Metric tons 000 omitted)

Mo. ave.	PRODUCTION* Iron ore	Coke†	Pig iron and ferro-alloys	No. furnaces in blast	‡Steel ingots and castings	IMPORTS**@ Coke	Pig iron and ferro-alloys	Steel g	EXPORTS@ Pig iron and ferro-alloys	Steel g
1913	3,588	336	756	190	581	256	4.2	10	9	51
1928	4,099	367	832	155	792	447	4.9	9.7	54	343
1929	4,227	397	864	154	808	454	4.0	14	48	281
1930	4,038	421	836	137	787	380	14.0	21	45	273
1931										
Jan.	3,802	424	801	135	746	326	11	23	42	246
Feb.	3,396	398	726	133	693	330	14	22	44	265
March	3,564	432	775	133	722	352	12	19	44	265
April	3,312	409	739	133	675	300	8	16	41	249
May	3,195	399	724	129	674	270	8	16	32	232
June	3,277	369	691	121	650	312	7	18	37	259
July	3,232	359	679	115	651	277	6	18	39	242
Aug.	3,064	350	680	113	644	286	6	19	42	273
Sept.	3,139	346	655	111	655	285	5	22	28	256
Oct.	3,112	365	637	103	626	229	4	23	30	261
Mo. ave.	3,309	385	711	103	674	297	8	20	38	255

*Production for 1913 is for France in her present boundaries; †Coke production at the coal mines. on addition, the iron and steel works produce about 3,500,000 tons annually; ‡On last day of year or month; g Includes ingots, semifinished steel, all rolled products, forgings and scrap; **Since 1930, imports include tonnages to be re-exported after fabrication; @Import and export figures are inclusive of the Saar district.

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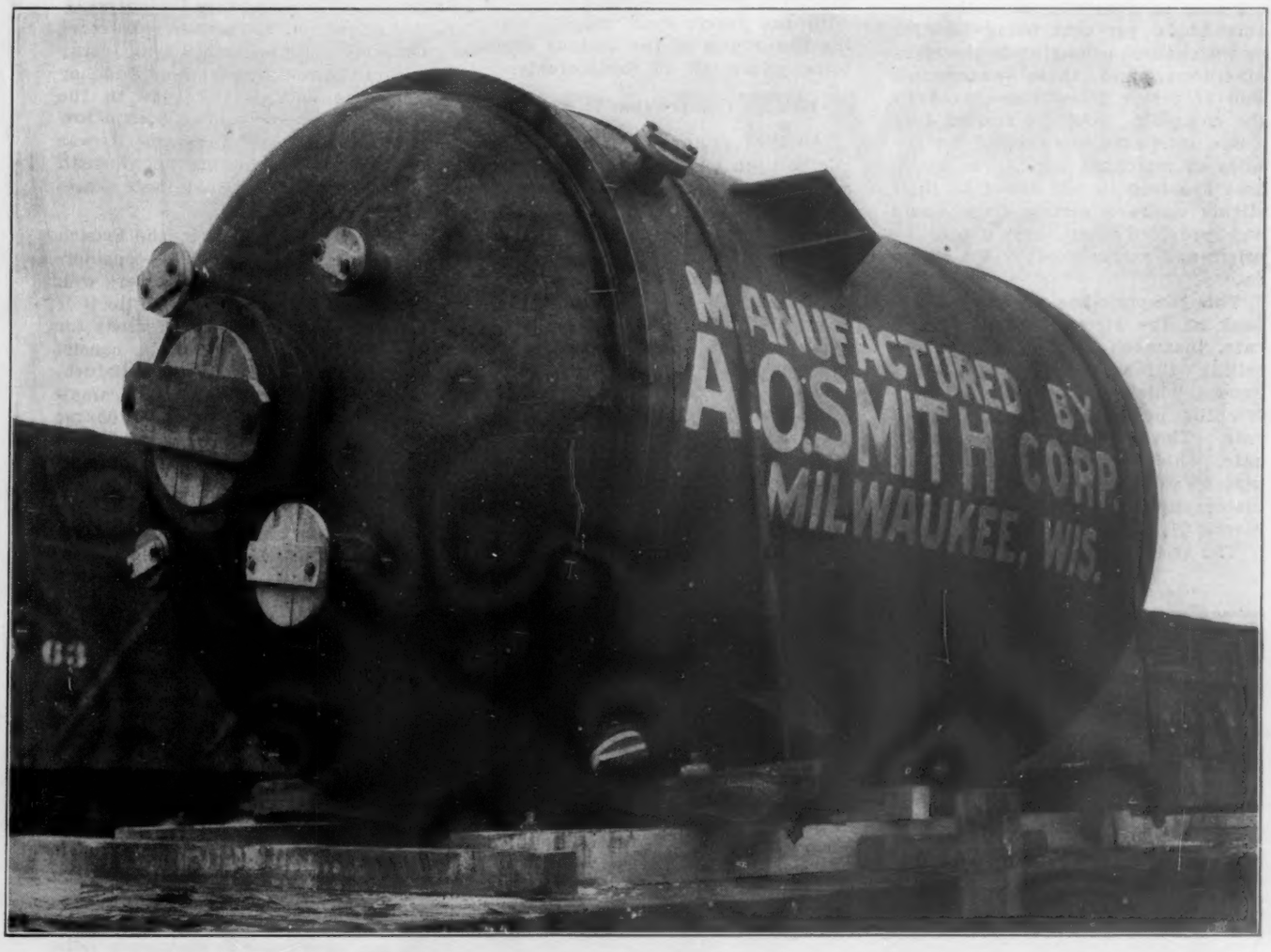

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group being in favor of this arrangement.

Up to the end of July the French A-products syndicate, which included semifinished steel and structural steel continued as in the past, but about the middle of the year export sales were released from the control of the syndicate. It was also decided that if during two consecutive months less than 20,000 tons of domestic orders were taken, the market would become free. As during August and September only about 11,000 tons were distributed among the members for each month, the market was released as from Oct. 17.

Syndicates Undergo Change

Previously, on Aug. 1, the comptoir was broken up into two separate syndicates, one for semifinished steel and the other for structural steel. The structural steel syndicate continued to function as before, but with unsatisfactory results, because it controlled only 30 per cent of domestic sales, the balance of 70 per cent being handled by warehouses belonging to the manufacturers, and these warehouses sold at prices below those fixed by the comptoir. At the end of July a new syndicate was formed for the sales of merchant bars. The members are free to sell direct to their clients up to a certain fixed quota and provided that they quote the prices and extras fixed by the syndicate.

This comptoir has the same drawback as the structural steel syndicate, inasmuch as many works are selling through their own warehouses, which are not obliged to follow the prices fixed by the syndicate. The plate and sheet syndicate, which controls the sales of plates, and sheets from 2.7 millimeters upward, was extended until March 31, 1932.

The gray pig iron syndicate, which was dissolved in October, 1930, was not reorganized, and the hematite comptoir, which was still in existence, suffered from the disruption of the market caused by keen competition on the part of foreign countries. In order to meet this competition the comptoir authorized its members to quote competitive prices and finally gave up all price control, the only object of the syndicate being to control production by means of provisional quotas. The tube syndicate operated normally, and, in fact, only two important groups now manufacture tubes in France, that of Louvroil-Recquignies-Valenciennes and that of Vincey-Sambre, so that agreement is easily maintained.

While France did not feel the effects of the industrial crisis to the same extent as most other countries, industry and trade suffered seriously and a number of banks and large industrial concerns sustained considerable financial trouble. Money became tight and the outlet for manufactured products became restricted, with the result that, notwithstanding the efforts of the various comptoirs, prices fell off considerably.

Belgian Competition Is Severe

Another factor was the serious competition on the part of Belgium, who, seeing her exports to overseas markets substantially reduced, managed to sell large tonnages of pig iron, semifinished steel and rolled products in the French market at low prices, notwithstanding the French duties on these products.

As a result, prices of semifinished steel products became seriously depressed, and when the market became free, 2-inch billets were quoted as low as 370 francs per ton, against 460 francs at the beginning of the year. The price of beams showed little variation. The comptoir had fixed the price at 620 francs up to February, and from that date the price remained at 550 francs. However, as the comptoir controls only 30 per cent of the tonnage consumed, this fixity of prices is somewhat theoretical.

There were large fluctuations in the price of merchant bars; they were quoted at 530 francs in January, and gradually the price dropped to 400 francs, and in June, reinforced concrete bars were quoted as low as 380 francs. However, as from the formation of the merchant bar syndicate, the prices were readjusted and fixed at 500 francs, Thionville parity. On account of the serious Belgium competition, the comptoir authorized its members to quote prices below the official level when necessary.

Raw Materials Suffer Also

The coal industry suffered from the effects of the reduction of the activities of the steel industry, while steps were taken by the government to limit foreign competition by means of a restriction on imports. The extraction of iron ore also considerably diminished. The scrap market showed a weakening tendency from one end of the year to the other and prices reached such a low level that in certain cases it was possible to manufacture open-hearth steel at a lower cost than basic bessemer steel.

The losses sustained by the French steelworks in 1931 will be considerable, because selling prices were wel. below production costs. While it is generally admitted that a remedy for this state of affairs would consist in reducing production, it is disturbing to note that a number of amalgamations have taken place, in course of which certain works that were taken over were restarted, while several companies are actually increasing their means of production. The outlook for the year 1932 is therefore uncertain, and gives rise to considerable anxiety.

The position of the French iron and steel trade at the year end continued to deteriorate and notwithstanding the important reduction in output, works cannot obtain sufficient orders to dispose of their current production. The reserve on the part of consumers is not only due to the general curtailment of business activities, but can also be traced to the unsatisfactory conditions prevailing on the Paris stock exchange, where the shares of almost every iron and steel concern are losing ground, thus increasing the lack of confidence among buyers. Furthermore, the working capital of many of these companies is narrowing, and under present conditions the banks are wary of giving assistance. Finally, the tendency of prices continues downward and is not an incitement to buyers, who are waiting to cover themselves at the last minute.

French Iron and Steel Exports

(Metric tons)

Principal Commodities	(First nine months) 1931	1930	1929
Pig iron	336,128	390,524	397,127
Ferro-alloys	13,763	7,565	7,005
Ingots	47,231	49,162	27,850
Semifinished steel	288,885	400,979	335,222
Bars and shapes	1,037,875	1,039,641	1,272,943
Special and tool steel	1,831	2,084	2,821
Wire rod	111,346	124,125	170,293
Bands, hoops and cold-rolled strip	85,601	79,938	71,624
Plates and sheets, black and galvanized	151,880	135,065	130,958
Tin, terne and coppered plates	26,472	18,644	22,025
Wire products	42,787	30,743	37,371
Wire nails, screws, nuts and bolts	28,576	36,002	44,670
Rails and track material	214,715	249,304	250,868
Tires, wheels and axles	11,012	15,407	16,321
Constructional steelwork	152,877	187,100	193,102
Cast iron pipe, columns, etc.	147,610	178,688	223,398
Other iron castings	10,738	16,087	14,948
Cables, chains, anchors and barbed wire	8,430	9,017	13,065
Forged tubes, boilers, reservoirs	33,384	51,287	59,282
Hardware	22,878	29,779	31,379
TOTAL	2,774,019	3,051,141	3,322,272
Scrap and turnings	258,486	230,996	267.303
TOTAL, including scrap	3,032,505	3,282,137	3,5 9,575

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Belgium's Exports Affected By Desperate Competition

European Staff Special

FROM the beginning of the year 1931 there was in Belgium a serious reduction of orders for iron and steel from South America, India, China and Japan. Europe was then the best consumer but Norway suffered from a lockout of long duration, and the effects of the German crisis, which made themselves felt early in the year, destroyed the last support of the export market.

Export Demand Is Reduced

Great Britain continued to buy, but when the pound sterling left the gold standard at the end of September a reduction in trade from that source followed, although toward the end of the year there was a spurt of business on account of the menace of the imposition of a tariff. Belgian exporters, however, are seriously put to, as it is certain that such a tariff will be effected against steel products early in 1932, and Great Britain has been one of Belgium's best customers.

Due to the fact that Belgium relies on export business to dispose of the greater part of her production, the circumstances prevailing during the past year resulted in considerable depression in the Belgian steel industry, owing to the uneconomic level of export prices which prevailed during by far the greater part of the year.

In view of this position, it is somewhat surprising that in comparison with other countries' output of steel Belgium's output has shown only a comparatively small reduction; and, in fact, during the summer months the monthly output was higher than in the corresponding months of 1930. It is believed that the bigger works were anxious to inflate their production in order to obtain a good bargaining position with respect to the reorganization of the European steel entente. The ability of the larger concerns to sustain a loss during a certain period also enabled those concerns to continue producing, thus tending to drive the smaller works out of the market.

The average monthly output of steel during the first 10 months of 1931 was only 9.6 per cent below that of the corresponding period of 1930. For pig iron the decrease was only 5½ per cent, and the number of stocks operating Oct. 31 was 45, the same as on Jan. 31.

Wire Products Are Syndicated

Owing to the satisfactory result of its working, and under the incentive of strong American and Japanese competition in the Far East, the wire rod syndicate was renewed for a period of five years as from Jan. 1, 1932. This result was also obtained thanks to the formation in Belgium of a syndicate of wire product manufacturers. Negotiations were rather difficult, as one of the leading works wished to remain outside, but finally an agreement was arrived at and the four large groups of Ougree and Sambre et Escaut in Belgium, Arbed in Luxemburg, and de Wendel in France, formed an international wire export company, with central offices in Brussels.

Owing to the competition referred to above, the aggregate quota of the international wire rod syndicate dropped from 500,000 metric tons per quaraer two years ago to 360,000 tons. The syndicate which controlled the sales of foundry pig iron, and which included Belgium, Luxemburg and France, was dissolved Aug. 8 and could not be renewed.

Price Decline Is Steady

Market prices showed a practically continuous descent up to September, when they appeared to stabilize. With few exceptions, all steel commodities followed this downward trend. In January, the price of 2-inch billets was £3 12s ($17.40) per metric ton, f.o.b. Antwerp. There was then a substantial drop until March, when a slight hardening of quotations was noted. Following the announcement of the Hoover moratorium proposal in June, prices rose sharply, but as soon as it was found that the scheme did not afford a solution to world problems, a considerable falling off in prices immediately followed.

The departure of the pound sterling from gold standard did not seem to affect Belgium's steel export prices. In October, an upward tendency in the price of wheat and raw materials in America had a beneficial reaction on steel prices, but in view of the lack of orders, quotations took a new turn downward, and toward the end of the year billets were quoted at as low as £2 17s,, gold, ($13.10). Merchant bars dropped from the level of £4 3s ($20.10) in January to £3 ($14.55) at the end of November, and beams dropped from £3 13s ($17.70) to £2 18s ($14.05). In May, 1914, billets were worth £3 11s 6d ($17.30), bars £4 3s ($20.10), and beams £5 5s ($25.45), but there was at that time a comptoir for the sales of structural steel.

Mixed Basis for Quotations

The departure of the pound sterling from gold standard created a state of confusion in the Belgian export trade and some works quoted in gold pounds, others in French or Belgian francs, and others in American dollars.

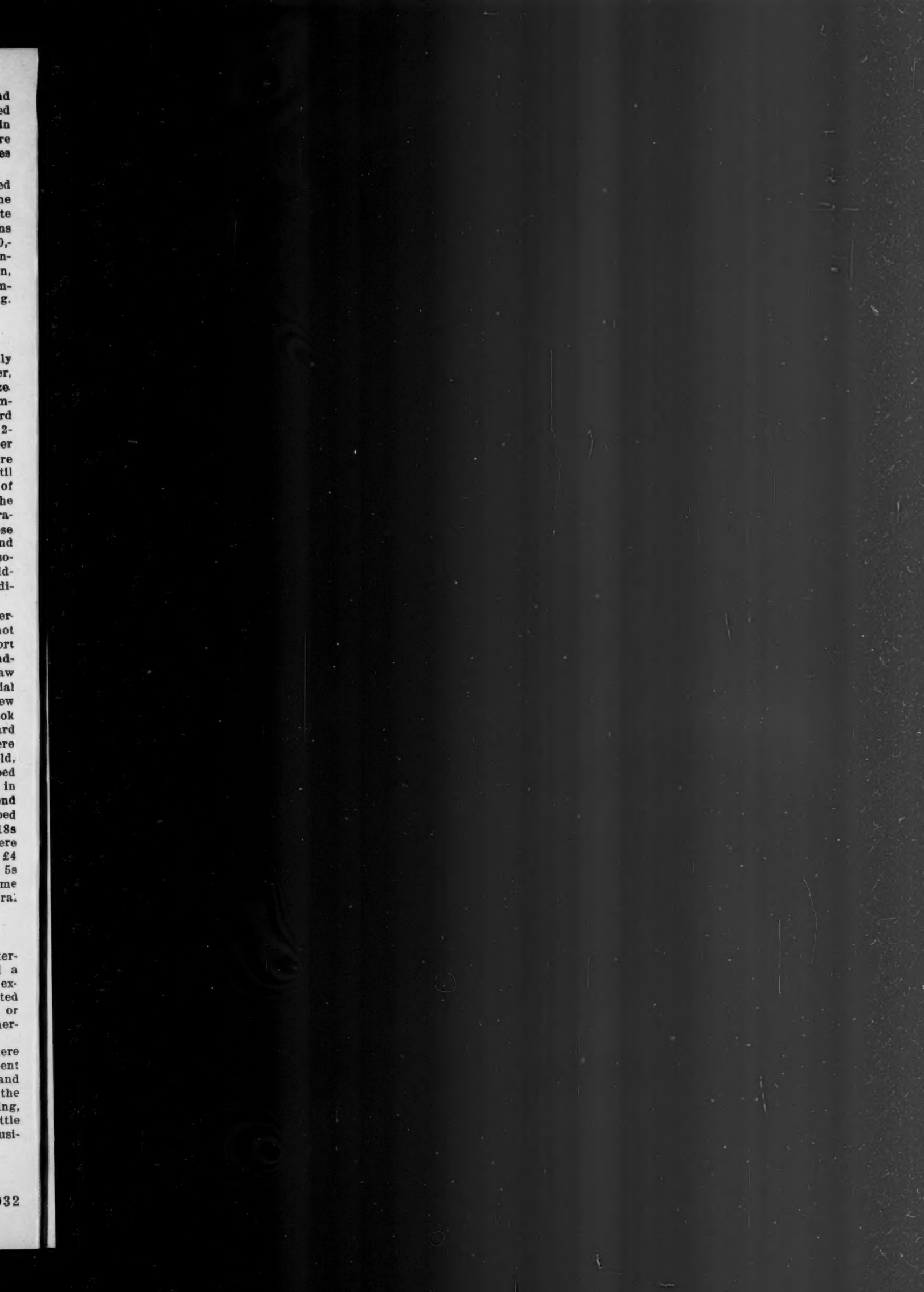
Toward the end of the year there was considerable unemployment throughout the mining and iron and steel industries in Belgium and the position generally was distressing, with depleted order books and little hope of an immediate revival of business.

Belgian-Luxemburg Business Progress in 1931

(Metric tons 000 omitted)

	PRODUCTION					IMPORTS		EXPORTS	
		Belgium		Luxemburg		Belgium and Luxemburg			
Mo. ave.	Coke	Pig iron and ferro-alloys	Steel ingots and castings	Pig iron and ferro-alloys	Steel ingots and castings	Pig iron	Steel‡	Pig iron	Steel‡
1913	294	207	206	212	98	48†	26†	1.4†	130†
1928	494	325	328	231	214	46	38	8	380
1929	499	341	344	242	225	56	37	10	395
1930	447	283	281	206	189	33	28	10	343
1931									
Jan.	417	270	263	183	172	25	28	8	285
Feb.	380	240	228	169	161	23	31	11	321
March	420	263	248	178	172	22	23	8	325
April	410	258	251	171	166	20	24	9	332
May	417	271	251	169	166	23	30	7	283
June	413	278	270	172	175	25	34	6	309
July	427	289	284	177	182	25	35	6	337
Aug.	435	299	290	174	175	34	36	5	298
Sept.	426	284	279	172	175	26	39	3	324
Oct.	410	272	268	172	177	...	...	...	...
Mo. Ave.	416	272	263	174	172	25	31	7	313

†Belgium only; ‡Includes iron castings and scrap.



in the Rhenish-Westphalian district was 41, and the average wage per worker per month was 157 Reichsmarks. Further wage reductions are being negotiated.

The pig iron market was particularly dull throughout the year, and only 3 per cent of the output was exported, making a total of 156,985 metric tons for the first 10 months. Fifty per cent of these shipments went to Russia. Imports of pig iron into Germany in the corresponding period were only 102,510 metric tons. Domestic prices were reduced by about 3 per cent at the beginning of the year, and then remained fixed at 78 Reichsmarks per ton for foundry pig iron, containing 2.5 to 3 per cent silicon.

Scrap and Ore a Burden

The scrap market was unsatisfactory, and scrap quotations dropped by about 50 per cent during the year. A serious situation continues to prevail with respect to iron ore on account of the important contracts previously made with Swedish firms, which contracts run to the year 1942. The Swedish mines, however, have agreed to the postponing of deliveries and to cancellation of deliveries not made in 1931, with the result that German imports of iron ore declined from 12,241,705 metric tons in the first ten months of 1930 to 6,340,723 tons in the corresponding period of last year.

Already at the end of 1930 the value of German stocks of iron ore was estimated at 80,000,000 Reichsmarks.

The outlook for the year 1932 is most uncertain. The difficulties with which Germany is faced in her own market are added to by such disturbing influences as the fluctuations in the sterling rate and the almost certain imposition of a tariff against foreign goods in Great Britain.

Central Europe Has Share Of Industrial Depression

BY DR. ING. TILLE
Special Correspondent

AS FAR as the iron and steel industry is concerned, the general economic crisis in central and eastern Europe manifested itself in the course of 1931 in a further reduction of the output of pig iron and raw steel. The level of domestic prices did not, it is true, suffer a serious drop, but in spite of this, the tendency of the iron and steel markets was, on the whole, a falling one.

In Czecho-Slovakia, iron and steel prices had been reduced by an average of 7 per cent toward the end of 1930. This, however, did not bring about any revival of the market; on the contrary, sales decreased still further, and this resulted in a reduction of the output of pig iron and steel amounting to about 15 per cent and 12 per cent respectively in comparison with 1930. In every branch of the industry investments were restricted to the minimum, and the steel industry found itself with considerable lack of employment.

Czecho-Slovak Exports Important

The Czecho-Slovak steelworks syndicate was prolonged up to the end of 1940. Czecho-Slovakia still remains affiliated to the international cartels, such as the IRMA (International Rail Makers Association), the EJA (European Steel Entente), the IWV (International Wire Rod Syndicate) and the IWECO (International Wire Export Co.) and others.

The iron and steel exports of Czecho-Slovakia form about 50 per cent of the total output of that country, and a considerable portion of these exports, about 65 per cent, was exported to Russia. In the latter part of 1931 an act was passed granting state guarantees for export business.

Business relations with Russia, however, gradually declined, owing to the difficulty of financing these transactions on 18 months' credit and of getting the Russia bills discounted. The depreciation of the pound sterling also had a disturbing effect upon the continuity of deliveries to Russia, since a considerable part of the contracts had been booked for payment in pounds.

Credits Trouble Austria

In Austria the economic situation further deteriorated, due to the important bank failures which occurred in the early summer and to the uncertain political situation brought about by the disturbances on the part of the nationalist party, which aimed at the overthrow of the government. The decrease in output, if the figures so far known for 1931 are compared with those of 1930, amounts to 48 per cent for pig iron and 22 per cent for raw steel. In spite of this, prices remained practically unchanged.

In Hungary the output of raw steel in 1931 fell more than in any other of the central European states. The output in 1929 was 513,000 metric tons, whereas in 1930 it was only 370,000 tons, and it certainly will not attain a higher figure than 240,000 tons for 1931, that is to say, it will be nearly 40 per cent lower than the output of the preceding year.

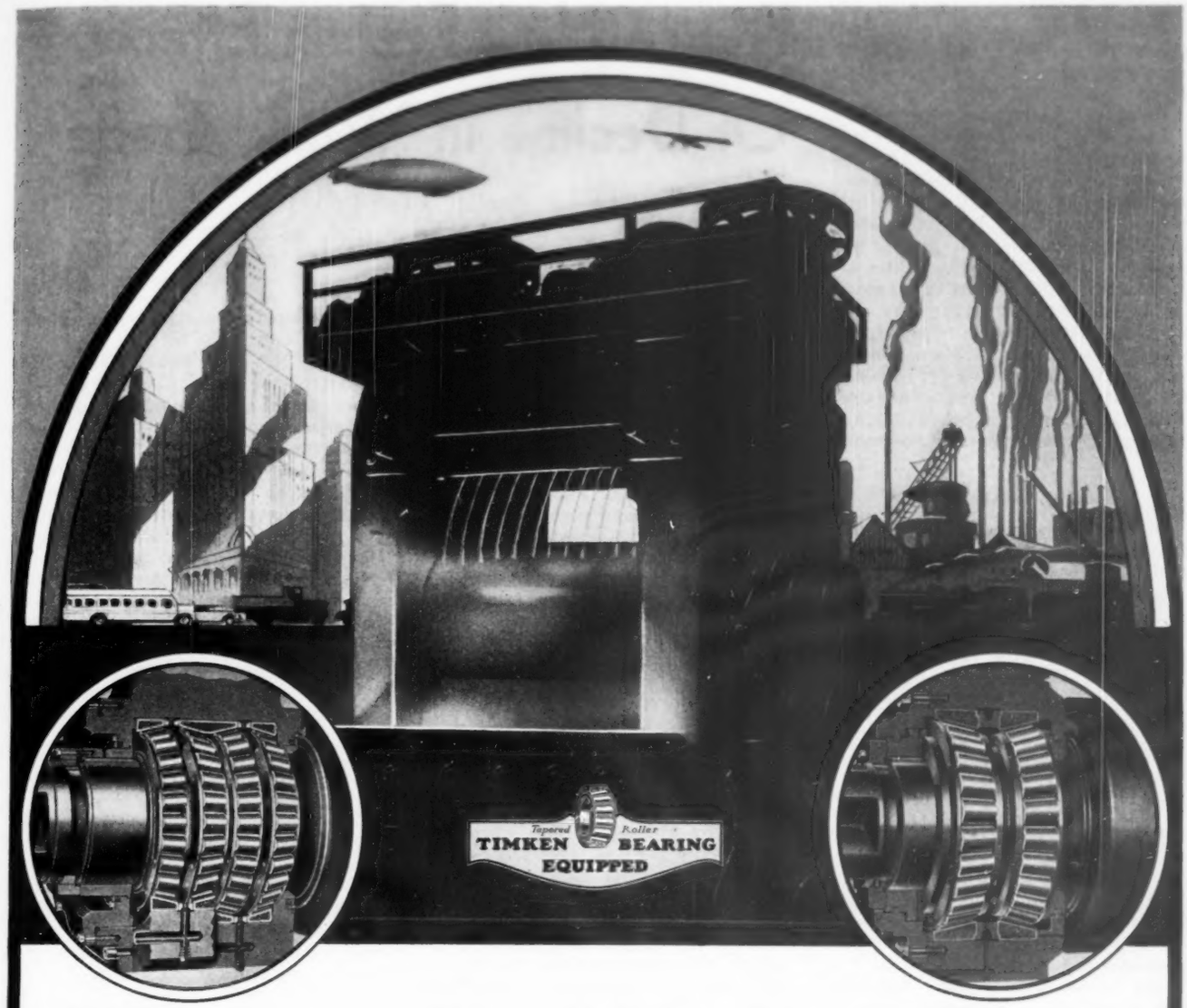
Both Austria and Hungary are members of the international iron and steel syndicates, while Poland still remains an outsider.

Although the fall in the output of the Polish works during the last two years was smaller than in any of the states mentioned above, the reduction of the pig iron output in 1931 being about 13 per cent, and that of raw steel 6 per cent, in comparison with 1930, the situation of the iron and steel industry in Poland is serious. The reason for this is the con-

German Iron and Steel Exports

(Metric tons)

Principal Commodities	(First nine months) 1931	1930	1929
Pig iron	145,304	164,843	290,446
Ferro-alloys	6,589	1,298	35,825
Ingots and semifinished steel	284,361	304,921	347,051
Bars and shapes	718,510	810,614	1,014,569
Hoops and bands	94,240	111,745	
Plates and sheets, black and galvanized	312,633	411,955	500,241
Tinplates	45,118	26,524	21,305
Wire rod and wire products	300,565	306,519	463,186
Wire nails, screws, nuts and bolts	66,779	73,506	85,920
Rails and track material	215,375	263,383	330,341
Tires, wheels and axles	29,025	47,637	48,371
Structural steelwork	46,709	101,799	67,776
Forgings and malleable castings	181,013	215,167	183,536
Cast iron pipe	64,899	80,373	88,298
Other iron castings, except malleable	122,822	135,623	135,593
Anchors, anvils, hammers, blocks, etc	3,712	5,976	6,011
Forged tubes	162,702	212,362	281,943
Boilers, reservoirs, etc	61,156	71,267	84,287
Hardware	23,756	31,922	32,808
TOTAL, including items not specified	2,999,648	3,539,537	4,191,520
Scrap and turnings	182,881	209,871	179,458
TOTAL, including scrap	3,182,529	3,749,408	4,370,978



Dominant On Mill Roll Necks

In conjunction with the steel industry's sweeping program of modernization, mill operators have shown an overwhelming preference for Timken Heavy Duty Mill Type Bearings for roll necks.

Despite economic conditions of the last two years, more rolling mills were equipped with Timkens than ever before. Furthermore, by far more Timken Bearings went into roll neck service during this period than all other makes of anti-friction bearings combined.

Behind this dominance are three basic reasons: (1) Timken is the only type of bearing geometrically designed to carry all thrust loads and all radial loads within itself, and without auxiliary supports. (2) Timken is the only type of bearing that can be set up with extremely close radial running clearance and held to that clearance permanently. (3) Timkens have years of longer life, because wear that occurs in a Timken Bearing does not necessitate take-up more frequently than a "non take-up" bearing has to be replaced.

Endorse the leading mill builders' judgment when buying new equipment. Specify Timkens. The Timken Roller Bearing Company, Canton, Ohio.

TIMKEN *Tapered Roller* **BEARINGS**

siderable decrease of sales in the Polish domestic market, which decrease the industry endeavored to counteract by exporting more than 66 per cent of the total output.

Of this exported tonnage, nearly 95 per cent went to Russia, which means that exports of Polish iron and steel products to Russia formed more than 60 per cent of the total output. As a large part of this export business had been booked for payment in pounds sterling, the depreciation of that currency caused the Polish works to suffer very considerable losses, and in view of this and the fact that the state guarantees previously granted for Russian credit have already been exhausted, the Polish iron and steel industry is in an exceedingly precarious position.

Russia and Balkans Dull

In Rumania the economic position has taken a turn for the worse, which manifests itself, as far as the iron and steel industry is concerned, in a decrease in the production of raw steel in 1931 of about 25 per cent compared with the production of the year 1930. The total output will in all probability not even reach 100,000 tons.

In Yugo-Slavia the exchange control act prevented depreciation of the currency, but the situation of the iron and steel industry is unsatisfactory, the production of raw steel being negligible.

Even in Russia the output of raw steel in 1931 fell by about 6 per cent in comparison with the previous year's figures, although hitherto the tendency had been a rising one.

The latest reports state that the completion of the five-year plan is encountering considerable difficulties of a technical nature, which apparently have not failed to leave their mark on the state of employment in the Russian steel industry.

France Now Feeling Effects Of Decline in World Trade

BY J. M. LEON
French Correspondent, STEEL

THE forebodings which manifested themselves at the end of 1930 concerning the position of the French steel industry materialized rapidly, owing to the depression which spread over all steel-consuming countries. The result was first felt by those works which were accustomed to enjoy a large measure of export trade. As export orders became severely restricted those works had to concentrate their efforts on the domestic market by offering large tonnages, which had a depressing effect on prices.

Government Aid Given

The average monthly output of steel ingots and castings in the first ten months of the year was 15.11 per cent less than in the corresponding period of 1930, and tended to decrease. The tonnage of steel declared by France to the European steel cartel for the first three-quarters of 1931 was 6,110,585 metric tons, an excess of 54,521 tons or 0.9 per cent over the tonnage allowed, France having the advantage of an active domestic market, thanks to the protectionist policy, which enabled agriculture and industry to preserve their buying power. Owing, however, to the substantial decrease in the volume of export orders for steel products, a number of works in France had to curtail their activities and operate only a few days per week or hours per day.

The government took measures to alleviate the crisis in France, and a part of the plan for national equipment, covering the improvement of roads, the electrification of villages, and extensions at certain harbors, will soon be put into effect. Furthermore, the government will authorize the railroad companies to issue a loan which will enable them to place a number of large contracts for track material and rolling stock which have been held back since the middle of 1931, when the railroad companies showed a very large deficit. Wages were reduced by an average of about 6 per cent. There were no serious strikes during the year, except in the northern districts, where stoppages occurred in the textile industries.

The French steel market is controlled to a considerable extent by a number of syndicates, which are themselves closely linked with the European steel entente. The influence of the entente during the year was, however, practically without effect on the market.

Entente in Abeyance

A scheme of reorganization had practically been arrived at, with a view of fixing for each member country a tonnage quota for export business, but when the final scheme was to be submitted for consideration, the German financial crisis occurred, with the result that the time was considered unfavorable for renewing the entente, the life of which was simply extended from month to month until Dec. 31, 1931, awaiting opportunity for revival.

In France, the national wire rod syndicate, like the international syndicate, was extended for a period of five years, and a number of new works joined the French syndicate, which now includes practically all the manufacturers of wire rod. Satisfaction is generally expressed at the manner in which this syndicate worked, and it is to be noted that the prices of this commodity were well maintained throughout the year. The French syndicate of wire product manufacturers which was set up in 1930 was also continued, and will eventually be linked up with an international syndicate, the French

French Business Progress in 1931

(Metric tons 000 omitted)

Mo. ave.	PRODUCTION* Iron ore	Coke†	Pig iron and ferro-alloys	No. furnaces in blast	‡Steel ingots and castings	IMPORTS**@ Coke	Pig iron and ferro-alloys	Steel g	EXPORTS@ Pig iron and ferro-alloys	Steel g
1913	3,588	336	756	190	581	256	4.2	10	9	51
1928	4,099	367	832	155	792	447	4.9	9.7	54	343
1929	4,227	397	864	154	808	454	4.0	14	48	281
1930	4,038	421	836	137	787	380	14.0	21	45	273
1931										
Jan.	3,802	424	801	135	746	326	11	23	42	246
Feb.	3,396	398	726	133	693	330	14	22	44	265
March	3,564	432	775	133	722	352	12	19	44	265
April	3,312	409	739	133	675	300	8	16	41	249
May	3,195	399	724	129	674	270	8	16	32	232
June	3,277	369	691	121	650	312	7	18	37	259
July	3,232	359	679	115	651	277	6	18	39	242
Aug.	3,064	350	680	113	644	286	6	19	42	273
Sept.	3,139	346	655	111	655	285	5	22	28	256
Oct.	3,112	365	637	103	626	229	4	23	30	261
Mo. ave.	3,309	385	711	103	674	297	8	20	38	255

*Production for 1913 is for France in her present boundaries; †Coke production at the coal mines, on addition, the iron and steel works produce about 3,500,000 tons annually; ‡On last day of year or month; g Includes ingots, semifinished steel, all rolled products, forgings and scrap; **Since 1930, imports include tonnages to be re-exported after fabrication; @Import and export figures are inclusive of the Saar district.